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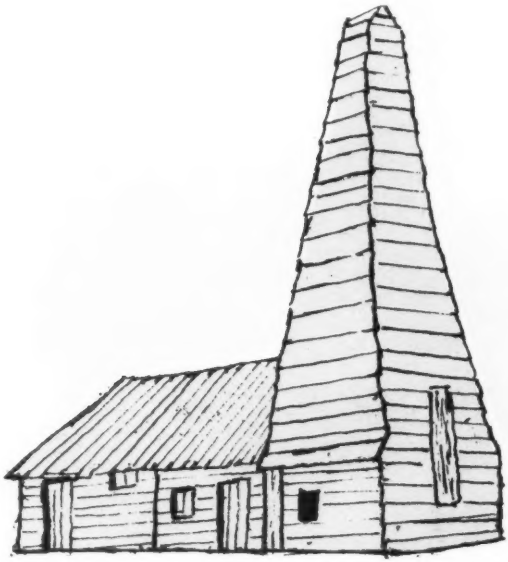

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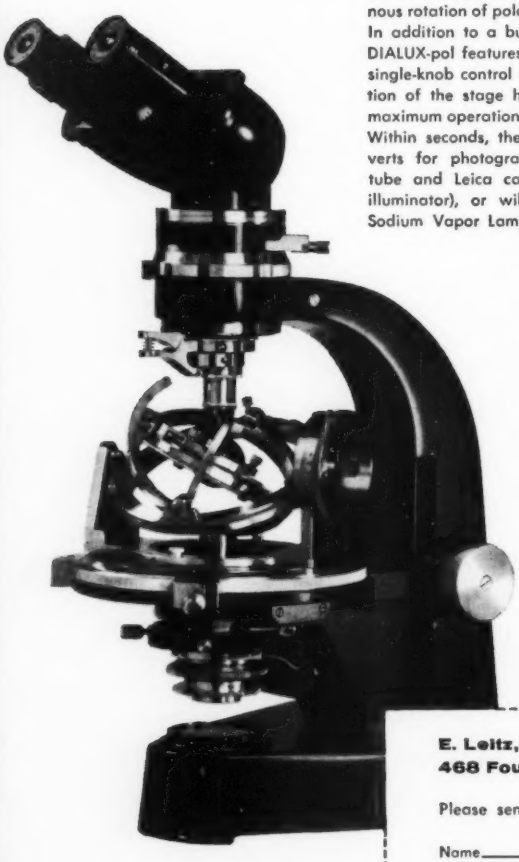

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Calendar

Cooperation of Society Secretaries in supplying meeting notices for GEOTIMES calendar is requested.

Feb. 2-4, 1959—AAPG: Rocky Mountain Sect., 9th Ann. Convention, Civic Auditorium, Albuquerque, N. M.

Feb. 5-6, 1959—AGU: Pacific Southwest Region, Stanford, Calif.

Feb. 5-6, 1959—EASTERN SNOW CONFERENCE, hdqtrs at Commander Hotel; technical sessions at M.I.T. Write: Gordon R. Ayer, P. O. Box 948, Albany 1, N. Y.

Feb. 15-19, 1959—AIME: Annual Meeting, joint with SEcG, Hotels St. Francis, Sheraton-Palace, Sir Francis Drake, San Francisco, Calif. Includes a symposium on all phases of exploration, including management.

Feb. 24-25, 1959—UNIVERSITY OF OKLAHOMA, 6th Biennial Geology Symposium, Norman, Okla.

Mar. 1-4, 1959—PROSPECTORS & DEVELOPERS ASSOC., 27th Ann. Mtg. and Convention, joint with Geol. Assoc. of Canada and Mineralogical Assoc. of Canada, Royal York Hotel, Toronto, Ontario.

March 4, 1959—5th MUSKEG RESEARCH CONFERENCE, Winnipeg, Manitoba. Write: I. C. MacFarlane, Div. of Bldg. Research, Nat. Res. Council, Ottawa 2, Ontario, Canada

Mar. 8-14, 1959—ASP-ACSM: Ann. Mtg., Shoreham Hotel, Washington, D. C.

March 16-19, 1959—AAPG-SEPM: 44th Annual Meeting, Memorial Auditorium, Dallas, Texas.

Mar. 30-Apr. 2, 1959—ASSOC. OF AMER. GEOGRAPHERS, Penn-Sheraton Hotel, Pittsburgh, Pa.

April 1-5, 1959—GSA: Cordilleran Sect., Tucson, Arizona.

April 2-3, 1959—AIME: SOC. PETR. ENG., Fifth Ann. Joint Mtg. of Rocky Mountain Petroleum Sects., Casper, Wyo.

April 2-4, 1959—OPTICAL SOCIETY OF AMERICA, Spring Mtg., New Yorker Hotel, New York.

*April 2-4, 1959—SEPM: Permian Basin Sect. Annual meeting, Roswell, N. M. Field trip to Sacramento Mountains area April 3 & 4.

April 5-10, 1959—AMER. CHEM. SOC., 135th Ann. Mtg., Boston, Mass.

April 13-14, 1959—LAKE SUPERIOR INSTITUTE ON GEOLOGY, University of Minnesota, Minneapolis, Minn.

April 13-15, 1959—CIMM: Ann. Gen. Mtg., Queen Elizabeth Hotel, Montreal, Quebec, Canada.

April 13-15, 1959—ASSOCIATION OF AMERICAN STATE GEOLOGISTS, Lawrence, Kansas.

April 16, 1959—OHIO ACAD. OF SCIENCE, Capital University, Columbus, Ohio.

April 16-18, 1959—GSA: Southeastern Section, Chapel Hill, N. C.

April 27-28, 1959—SEGp: 12th Ann. Midwestern Meeting, Cortez Hotel, El Paso, Texas.

April 27-30, 1959—INTERNATIONAL SYMPOSIUM on Physical Chemistry of Extractive Metallurgy, Penn-Sheraton Hotel, Pittsburgh, Pa.

May 4-7, 1959—AGU: Annual Meeting, Washington, D. C.

May 7-8, 1959—AIME: SOC. PETR. ENG., Permian Basin Sect. Oil Recovery Conf., Midland, Tex.

May 14-16, 1959—GSA, Rocky Mountain Section, Montana State University campus, Missoula, Montana.

May 14-23, 1959—INTERNATIONAL PETROLEUM EXPOSITION, Tulsa, Okla. For reservations write: IPE Housing Bureau, Oil Capital Bldg., Tulsa, Okla.

May 30-June 6, 1959—5th WORLD PETROLEUM CONGRESS, Permanent Council, New York. Write: C. E. Davis, Gen. Sec'y. 527 Madison Ave., New York 22.

June 11-12, 1959—IUCr. Commission on Crystallographic Apparatus, two conferences at Karolinska Institutet, Stockholm, Sweden. Inquire: Dr. William Parrish, Philips Laboratories, Irvington-on-Hudson, New York

June 15-17, 1959—SECOND SYMPOSIUM on X-Ray Microscopy & X-Ray Microanalysis, Stockholm. Inquire: Dr. G. Hoglund, Inst. f. Medicinsk Fysik, Karolinska Inst., Stockholm 60, Sweden.

Aug. 24-30, 1959—5th CONGRESS OF THE INTERNATIONAL COMMISSION OF OPTICS, Stockholm, Sweden.

Aug. 30 - Sept. 12, 1959 — INTERNATIONAL OCEANOGRAPHIC CONGRESS, AAAS, UNESCO & ICSU special committee on oceanic research cooperating; United Nations Bldg., N.Y. Write: Dr. Mary Sears, Woods Hole Oceanographic Institution, Woods Hole, Mass.

October 8-10, 1959—OPTICAL SOC. OF AMERICA, Ann. Mtg., Chateau Laurier, Ottawa, Canada.

Nov. 9-12, 1959—SEGp: Ann. Mtg., Biltmore Hotel, Los Angeles, Calif. Jointly with Pacific Section of AAPG on Nov. 12.

Nov. 12-13, 1959—AAPG: PACIFIC SECT., Biltmore Hotel, Los Angeles, Calif. Jointly with SEGp on Nov. 12.

Dec. 12-13, 1959—OKLAHOMA ACAD. OF SCIENCE, Earth Science Sect., Ann. Mtg., Weatherford, Okla.

July 25-Aug. 6, 1960—IUGG: General Assembly, Helsinki, Finland. Inquire: Sec. Gen. G. Laclavere, 30 Avenue Rapp, Paris 7, France.

*Aug. 6-12, 1960—19th INTERNATIONAL GEOGRAPHIC CONGRESS, General Assembly of the IGU and meetings of the IGU Commission, Stockholm, Sweden. Inquire: The International Geographic Congress Postfack Stockholm 6, Sweden.

*Aug. 15 - 25, 1960 — XXI INTERNATIONAL GEOLOGICAL CONGRESS, to be held at the Mineralogical Geological Museum of the University of Copenhagen in Denmark. Field trips before and after the meetings.

1959 SCHEDULE OF FIELD TRIPS

For additional field trips held in conjunction with meetings, see those items marked with an asterisk under meeting calendar.

April 11—ILLINOIS STATE GEOL. SURV., trip to Metropolis area of Massac & Pope Counties, Illinois.

April 12—LAKE SUPERIOR INSTITUTE ON GEOLOGY Field Trip to igneous and metamorphic rocks of Minnesota Valley. Write: J. C. Craddock, Dept. of Geol. & Mineral., Univ. of Minnesota.

April 24-25—SEPM: Pacific Section, Annual Spring Field Trip, Boulder Creek area, Santa Cruz Mountains, Calif. Write: A. A. Almgren, P. O. Box 1031, Bakersfield, Calif.

April 25—ILLINOIS STATE ACAD. OF SCIENCE, Field Trip.

May 2—ILLINOIS STATE GEOL. SURV., trip to Hardin area of Calhoun Co., Illinois.

May 16—ILLINOIS STATE GEOL. SURV., trip to Wilmington area of Will, Kankakee & Grundy Counties, Illinois.

Sept. 10-12—ALBERTA SOC. OF PETR. GEOLOGISTS, 9th Field Conference. Technical session Sept. 10, trip to Moose Mountain Sept. 11, trip to Drumheller Sept. 12.

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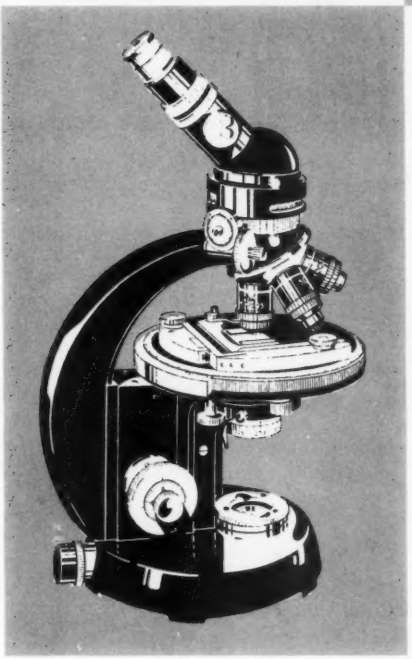

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GeoScience Abstracts replaces Geological Abstracts, publication of which was discontinued by the Geological Society of America in December 1958.

This Month in GEOTIMES

Professional News Magazine

Published by THE AMERICAN GEOLOGICAL INSTITUTE

Robert C. Stephenson, EDITOR

Kathryn Lohman, CIRCULATION MANAGER

VOL. III, No. 5 JANUARY-FEBRUARY, 1959

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J. D. 59' in 1859

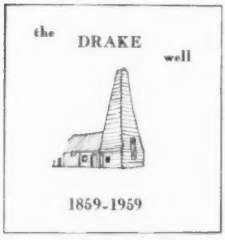
EIGHTEEN FIFTY-NINE was the year in which the radical abolitionist, John Brown, staged his daring raid on Harpers Ferry where he seized the federal arsenal in a move calculated to produce an uprising of the restive slaves. John Brown was subsequently captured, convicted of treason and hanged, thus closing one of the incidents which figured prominently in touching off the Civil War. He was immortalized in the enduring ballad:

John Brown's body lies a-mouldering in the grave
His soul goes marching on.

Though not historically recorded in an all-time favorite song, another event occurred in 1859, a few months prior to the Harpers Ferry incident, which marked a profound point of departure in history. The date was August 27, a Saturday, when Uncle Billy Smith, erstwhile driller of salt wells, at the end of a week's work pulled the crude drilling tools from the 69 foot hole which he was drilling about one and a half miles south of Titusville, Pennsylvania. His employer was one "Colonel" Edwin L. Drake, a Connecticut yankee. Colonel Drake was a man with a conviction. He believed that petroleum could be found by drilling a well and with dogged determination, in the face of local ridicule, he set out to prove this conviction. Returning to the rig on Sunday, Uncle Billy was excited to find oil atop the water in the hole. *The Drake Well had found oil!*

With the success of the Drake Well, wells were soon to start and by the early sixties the modern petroleum industry began taking shape. Fabulous pages of history describe the oil boom which blossomed rapidly in Pennsylvania and spilled over turbulently to the west and south. "Creekology" hunches and wild guesses were the prevailing oil-finding "theories" of the day.

The fantastic wildcat discoveries and the rampant speculation of the era left little room for appreciation of the work of Hunt, Andrews, Leslie, Carll, White and others who were the founding fathers of modern petroleum geology. In 1959, one hundred years later, we all can profit with a review of the history of petroleum geology as background for steering the course of the future.



OUR COVER

The Drake Well drilled one hundred years ago at Titusville, Pennsylvania, opened the era of the modern petroleum industry. The Drake Well was completed August 27, 1859.

The AMERICAN GEOLOGICAL INSTITUTE is a non-profit professional service organization established and managed by the scientific societies in the fields of geology and geophysics in cooperation with the National Academy of Sciences-National Research Council. It is the instrument of the profession serving and advancing the welfare of the geoscientist in matters relating to education, professional responsibilities and government relations. It is an active member of the Scientific Manpower Commission. It also functions in the stimulation of public education and awareness of the earth sciences, through career literature, the scouting program and other channels of communication.

GEOTIMES is the news magazine of the geological sciences. It reports on current events in the earth sciences, public education and public relations efforts throughout the profession, as well as appropriate legislative and governmental issues. It announces scholarships, fellowships, publications and new developments. It provides a forum for discussion of timely professional problems, and affords a common bond between the many specialized groups within the earth sciences

Extra-Terrestrial Geology

Some suggestions for getting geologic studies into orbit.

by ROBERT GREENWOOD [1]

The following thoughts were stirred by a letter from Frederick I. Ordway, III, published on p. 12 of GeoTimes for April, 1958.

The recent inauguration of the National Aeronautics and Space Administration, followed by the appointment of a Space Science Board by the National Academy of Sciences (*GeoTimes, Sept. 1958*), has focused attention on research programs for extra-terrestrial exploration. Though there is room for argument over the timetable, and the rate of progress which is both possible and desirable, the outlines and sequence of space exploration are already fairly clear. We will deal first with the Moon, next with Venus and Mars, leaving the rest of the solar system in the capable hands of Buck Rogers for another generation.

The parlous state of our knowledge of the geology of the nearest planets is revealed by even the best accounts extant, such as Urey's *"The Planets"* (1952), and von Bulow's *"Tektonische Analyse der Mondrinde"* (*"Geologie," 555-609, Oct. 1957, Berlin*). Hypotheses are currently built on data of the most tenuous and fragmentary nature.

Space exploration divides itself into three mutually dependent tasks:

1. The choice of parameters to be investigated, or what types of data should be sought; and the interpretation and synthesis of such data when obtained.
2. The design of exploratory vehicles, their propulsion and their navigation.
3. The design of data-gathering instruments, and provision for recording and transmission of data.

Thanks to the stimulus of missile research in this country, the USSR, Great Britain, and elsewhere, the design of space vehicles has received serious attention from rocket engineers, and electronics engineers have produced instrumentation suited to the stringent requirements and limitations of small artificial satellites. Parts (2) and (3) are therefore fairly well along, and space exploration is rapidly growing into a headless animal for lack of development of Part (1). The difficulty seems to be that the investigation of the Moon, Venus and Mars calls for scientists experienced in the study of large masses of silicate rocks, a qualification not typical of astronomers, astrophysicists, or cosmologists in general. There exists in this country, however, a large body of scientists familiar with the composition, structure, and genesis of large masses of silicate rocks. If readers of "GeoTimes" recognize themselves in the above description, the point needs no further demonstration.

The geological profession should be initiating and guiding the research in space exploration now, because the gap between an idea and its realization is far longer, more expensive and more tedious in space research than in familiar field geology. If a vehicle sent to sample the Moon gathers irrelevant data in the wrong way, it is not the same as losing an afternoon's field notes.

Space exploration, in the foreseeable future, will be conducted by unmanned vehicles, for several cogent reasons:

1. The extra payload of food, water, shielding and other conveniences required by a human navigator may be better utilized for more instruments.
2. An unmanned vehicle, by radioing its findings, may avoid the immensely difficult engineering problems of a return to Earth.
3. The unmanned vehicle may be directed on a path of minimum energy (fuel) requirements, taking a longer time than would be tolerable for a human pilot, and permitting higher accelerations.

[1] DR. ROBERT W. GREENWOOD, Assistant Professor, Department of Geology, University of Houston, teaches mineralogy and field geology. He has studied at Cal Tech and Harvard and has worked on mineral investigations in the Yukon, Brazil, and Africa.

Types of Data

We will consider here, (1) the types of data which unmanned vehicles may gather, (2) the lines along which geologists should work with engineers to develop a feasible space program for the future:

1A) Vehicles to orbit in the upper atmosphere of the body may measure and report:

a. Temperature, pressure, density of atmosphere, both in sun and shade.
b. Chemistry of atmosphere, by absorption or mass spectrograph.
c. Photography of surface.
d. Topographic relief of surface by radar scanning.
e. Magnetic field.
f. Radiation, both cosmic and local.

1B) Vehicles to land on the surface of the body may measure and report:

a. Temperature, as above, including diurnal variation.
b. Radioactivity of surface materials
c. Chemistry of surface materials.
d. Photography of surface.
e. Seismic behavior. First the detection of natural tremors, and later the detonation of subsidiary missiles may be used to investigate the internal structure of the planet.

These are enough parameters to keep us busy, but I am sure readers of GeoTimes can think of others.

Development Stages

The development of the program (2) is envisioned in three stages, each of which may well occupy many years:

2A) *Earthbound.* Instruments will be designed and tested, first in artificial satellites of the type now launched by the U.S.A. and the U.S.S.R., and then in satellite vehicles designed to re-enter the atmosphere and land intact on the surface of the earth. In other words, the techniques of space exploration should be tested on the home ground until errors and inadequacies have been substantially eliminated. To name only one of the more difficult tasks, how can a rock or soil be sampled and analyzed automatically by apparatus compact and rugged enough to incorporate in a space vehicle? X-ray fluorescence analysis is a method requiring a minimum of separate operations, and its results are admirably suited to electronic transmission, but how small can such an apparatus be made, and what is its minimum power requirement? Certain elements, when bombarded with neutrons, emit gamma rays of

(Continued on page 26)

PROFESSOR CHARLES H. BEHRE (right) of Columbia University receives the Neil Miner Award for Outstanding Teaching from Professor Chilton E. Prouty, retiring President of the National Association of the Society, St. Louis, Missouri, November 1958. The following quotation is from the citation presented on the occasion: "As a teacher, Professor Behre has always been an inspiration to the student. In addition to his reputation as a teacher of high quality, backed by years of practical experience in the field, he is also recognized for his unstinting interest in the student from both the academic and personal standpoints." Dr. Behre, Professor of Economic Geology at Columbia, is a charter member of the AGT and has been active in many of its affairs.

Have Rocks . . . Will Travel

Scouting Magazine, the BSA magazine for adult leaders carried in its November 1958 issue, the article—*Have Rocks—Will Travel,* which urges the scout leader to seek and use the professional talent of his community. The article pointed to the excellent geologist-scouting relationship developed during Geology Month, October 1957. Two short paragraphs are quoted from this article as follows:

"In your community, perhaps in your neighborhood, there is a man who could say, if you mentioned the subject of geology, 'Have rocks, will travel'—meaning, 'I'll be glad to bring part of my collection of rocks and minerals to your pack or troop or Explorer unit meeting and tell your gang some interesting things about them.'

"When you invite some experts to help, you'll find them waiting to be asked. To others the idea will be new and doubtful, but they can be persuaded. Tell them the age range and number of boys. Recommend the maximum amount of time to be given to the subject. Urge the use of exhibits, demonstrations, question-and-answer periods, follow-up projects, and other audience participation methods when feasible."

Jerry Pollack in the role of science teacher explains a contoured model to junior high students in the special summer enrichment science course in geology at Norman, Oklahoma.

JUNIOR HIGH GEOLOGY

by JEROME M. POLLACK[1]

This past summer seventeen Junior High School students were taught a six weeks course in geology. The students were in the seventh and eighth grades and, of the seventeen, four were girls. The course was the first of what is hoped will be a program of summer enrichment courses in the sciences sponsored by the public school system of Norman, Oklahoma. The idea originated with Mr. Gene Aldrich, the principal of the Junior High School. The students attended the course voluntarily on a tuition basis, after invitations for participation were sent out by the Junior High based on achievement test scores. Therefore, the students were a selected group. The University of Oklahoma donated classroom space in their Geology building and made available the equipment (i.e., maps, minerals, rocks, fossils) which is normally used in the beginning physical and historical geology laboratories. No text was used, but the AGI made copies available of the Boy Scout Geology Kit employed last year in the nationwide Boy Scout geology program. The class met for one and a half hours, four days a week (Monday through Thursday) for each of the six weeks. In the final week of the session, the students were taken on an all day field trip to the Arbuckle Mountains (about 60 miles from Norman), for which the Norman school system provided the use of a school bus.

The classes were run as a lecture-demonstration and roughly covered a considerable amount of the same material that would be normally presented to the beginning college student enrolled in physical and historical geology. There was little conscious effort to "water-down" vocabulary or to avoid the more speculative aspects of the subject. Since these students had not yet "learned" to compartmentalize the various scientific disciplines, the physics, chemistry, and biology necessary to the subject was introduced where needed and accepted by the students as a natural part of geology. There was no need, as is sometimes the case with college students, to halfway explain why a chemical formula is being put on the blackboard.

As for student interest, though the class was using what would normally have been vacation playtime, attendance remained essentially 100 percent for the entire six weeks. The classes were lively and the questions frequent. Several of the boys were Boy Scouts and used this opportunity to work out their Geology Merit Badge requirements. The general attitude of the students might best be illustrated by the fact that after a rather hot day on the field trip, practically every student carried off the bus at least one sack of fossil and rock specimens collected in the mountains.

Though the lecture material was presented within a general systematic framework, no attempt was made to keep to any rigid order of subject matter. As questions were brought up and their implications explored, if this led off on tangents, well, then, off we went. I might mention that the questions asked, though perhaps lacking some of the sophistication of a college student were for the most part astute and penetrating. The "why?" some of the youngsters interjected at crucial moments cut right to the core of some of the geological problems about which many of us have also asked "why?".

I have come away from teaching this course with the feeling that geology can and should be taught at the intermediate school level, if not as a separate subject, then at least as a complementary part of the sciences that are commonly given. Those students who will do well and are interested in the other sciences will probably do well and be interested in geology as well. Geology, with its inherent observational approach, seems particularly well suited for an age group which is naturally curious about its surroundings. I feel that we have tended to underestimate the wide interests of younger students as well as the drawing power of our science.

[1]Jerome M. Pollack, Assistant Professor and Head, Geology Department, Oklahoma City University, formerly taught at the University of Oklahoma. He has also worked for Humble Oil & Refining Co.

LEFT: Dr. David M. Delo addresses the convocation upon his inauguration as fifth president of the University of Tampa.

RIGHT: The personable geologist-educator-administrator, Dave Delo, looks up with a smile from his duties as president of the University of Tampa.

DELO NEW PRESIDENT UNIVERSITY OF TAMPA

Dr. David M. Delo was inaugurated on Saturday, December 13, 1958, as the fifth president of the University of Tampa in ceremonies which climaxed a two-day inaugural program. He came to the Florida campus from Wagner College on Staten Island, New York, where he had served as president since 1952. The University of Tampa is a private college.

Dave Delo was the first executive director of the American Geological Institute, and the tremendous job which he did in launching the Institute in the period 1949-1952 is well documented in the October 1958, 10th Anniversary Issue of *GeoTimes*.

Delo graduated from Miami University, Oxford, Ohio, and subsequently was awarded the Masters degree at the University of Kansas and received the degree Doctor of Philosophy in Geology at Harvard University. He taught at Washington University, Northwestern, Lawrence and Knox before entering government service in the Office of Scientific Research and Development during World War II.

At the inaugural ceremonies in Tampa Dr. Charles W. Campbell, vice president of the Prudential Insurance Company, gave the principal address.

The inaugural program also featured two symposia on *Strengthening Education Through Improved Education of Teachers*, and *The Role of the Independent University*. In the latter symposium geologist Carey Croneis, Provost, The Rice Institute, Houston, Texas, was one of the speakers. Dr. Croneis pointed out in his address that Russian and Red Chinese scientific progress leaves little room for complacency in the free world. He commented that the "challenge cannot be met with a scientific holiday—it must be neutralized by scientific overtime." He pointed to the significant statement made a year ago by Dr. Paul B. Sears before the AAAS, "our future security may depend less upon priority in exploring outer space than upon our wisdom in managing the space in which we live."

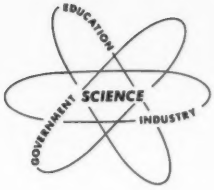
Dr. Croneis drew attention to the fact that engineers, scientists and other intellectual groups in Russia earn 7 to 10 times as much as factory workers and receive other fringe benefits which in reality sets them up as a successful capitalistic class in a country where capitalism does not exist. In contrast, in the United States a faculty member must, on the average, attain the rank of at least an associate professor to match the salary of the skilled worker.

He went on to point out the very important role of the independent colleges and universities in producing leaders of science. He cited the fact that only one of the 20 colleges and universities yielding the most young scientists in the interval 1946-1951 was a state-supported school. Croneis pointed to this among other reasons why "Through their unfettered independent action, they [the independent colleges and universities] will certainly continue to prove their sound and justifying worth."

In opening his inaugural address President Delo quoted geologist-paleontologist George Gaylord Simpson, who wrote "To make the wise choice for himself and his fellow men is the ethical responsibility of man which he must discharge if he is ever going to realize its benefits as a species." He went on to develop the theme that ours must be a "wise choice" in guiding the future of our American educational system. "Our intellectual resources . . . are the key to our future," he said, but "American education is suffering from intellectual and financial malnutrition. It is plagued with lack of prestige as expressed

(Continued on page 33)

SHARING THE SCIENTIST



By MATTHEW F. NORTON and
JAMES L. KAISER[1]

The American University Geology Department, in conjunction with personnel from the U. S. Geological Survey and the U. S. National Museum in Washington, D. C., is experimenting with a novel type of night instruction. The results may prove interesting to industry as well as to educators.

Although American University has many full-time students majoring in geology, it is one of the few colleges in the country offering both a B.S. and M.S. in geology based on evening courses. The opportunity for advanced education which this schedule provides the part and full-time employee, has particular appeal in the Washington, D. C., area.

By using top-level scientists as part-time instructors, much can be done to: (a) utilize our limited scientific resources, (b) improve industrial, governmental and educational communication, (c) create understanding and interest in earth sciences, and (d) provide a common meeting ground for students with potential employers. In management, either industrial or academic, we must program training and communication to make optimum use of scarce talents and develop skills to fulfill anticipated needs. Despite efforts of professional societies and individual geologists, industrial technicians and government research specialists seldom reach the student body which constitutes the great potential for future earth scientists.

As a first step in the experiment of bringing the geology student and the practicing scientist closer together, Dr. John W. Frey,[2] Chairman of the Geology Department, American University, conceived a course in Invertebrate Paleontology to be offered under unusual conditions. He selected, with university and government cooperation, J. Thomas Dutro, Jr., paleontologist with the U. S. Geological Survey, as chief instructor and course coordinator. In this capacity, Dutro prepares the course outline, establishes teaching and laboratory procedures, and provides administrative continuity to the course. During the Fall semester, the course emphasized eight phyla commonly encountered as fossils, namely: Protozoa, Porifera, Coelenterata, Bryozoa, Brachiopoda, Mollusca, Echinodermata and Arthropoda. Eight carefully selected volunteers from the Survey and the National Museum, each a specialist in a particular group of fossils, make up Dutro's team.[3]

Each instructor teaches approximately two weeks on his special field. Instruction includes reading assignments, lectures, lab work, specimen selection and examination. To answer those who challenge part-time professors, it should be noted that preparation has been outstanding. Variety, enthusiasm and knowledge of these dedicated specialists overshadow any disadvantage from the lesser degree of continuity inherent to such a system. Eight men, among the world's best teaching undergraduate work, make this Invertebrate Paleontology course one of the more stimulating known. To purely educational aspects comes added incentive for both teacher and student alike. Each teacher has an opportunity to expound and to develop thoughts on his particular subject; students the privilege to study and work with men who apply the science they teach. A nepionic career may change pace with the encouraging words: "*Have you considered being a paleontologist?*" Thus, science and management enter the classroom as a team.

Advantages to be gained by this exchange of knowledge and the establishment of mutual respect and understanding between top scientists and students far outweigh administrative burdens and individual sacrifices inherent to such a program. Perhaps this approach to teaching geology will show the way for industry, government and education to coordinate, cooperate and pool our wealth of scientific knowledge to

[1]DR. MATTHEW F. NORTON, Associate Professor of Geology, American University, and COLONEL JAMES L. KAISER, Management Analyst, Office of the Secretary of Defense. Colonel Kaiser, a West Pointer, was a geology major and has petroleum exploration interests.

[2]Not to be confused with Dr. John W. Frye, Chief, Illinois Geological Survey.

[3]In addition to Dutro, who presents the introductory and summary lectures and those dealing with the Brachiopoda, the scientists are: RICHARD S. BOARDMAN, U.S. National Museum, *Bryozoa;* RAYMOND C. DOUGLASS, U. S. Geological Survey, *Protozoa;* PORTER M. KIER, U. S. National Museum, *Echinodermata;* WILLIAM A. OLIVER, JR., U. S. Geological Survey, *Coelenterata* and *Porifera;* ALLION R. PALMER, U. S. Geological Survey, *Trilobita;* I. GREGORY SOHN, U. S. Geological Survey, *Ostracoda;* and ELLIS YOCHELSON, U. S. Geological Survey, *Mollusca.*

Palaeontological Association

New British Society

The Palaeontological Association, which was founded in Great Britain in February 1957 held a two day meeting, December 12-13, 1958, at the Sedgwick Museum, Cambridge, for a program on Micropalaeontology centered around 8 papers which were read.

Information about The Palaeontological Association and its new journal, *Palaeontology,* which is printed by the Oxford University Press, may be obtained by writing, *Dr. Gwyn Thomas, Secretary, Department of Geology, Imperial College of Science and Technology, Prince Consort Road, London S.W. 7.*

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the mutual benefit of all. How much this concept can be expanded with both government and industrial cooperation remains to be seen.

Should one infer that opportunity for cooperative education, based on a preponderance of geoscientists in Washington, D. C., may be restricted to the Capital area, we need only examine other centers of geoscience activity. What can be accomplished in such great geological communities as Dallas, New York, Denver, Los Angeles, New Orleans, to name only to few? In one, government geologist or survey personnel may dominate; in another, mining or petroleum men supply the bulk of the technical knowledge. By using available resources, earth science professions may keep up with the obvious national trend that demands higher technical capability.

Our current economy does not permit every ambitious young man with a future to stop for a term or a year of post graduate work. On the other hand, progress demands extensive study so that each scientist and technician can appreciate modern developments in the advancing field of science. While industrial and governmental requirements increase, our colleges face an even greater teacher shortage. The agency or community whose plans promote scientific cooperation will reap the reward of foresightedness.

We would like to believe that the development of any formula or pattern which up-grades geoscience as a whole commands the support of the scientific community. We hope that the small attempt of American University to make use of available teaching potential will perhaps start a trend in the geoscience communities of America—*"Share the scientist for the benefit of all."*

CALIFORNIA STATE GEOLOGIST

Ian Campbell, pictured above, early in January 1959, became the new chief of the California Division of Mines, replacing Olaf P. Jenkins, who retired early in 1958.

Dr. Campbell comes to the Division of Mines from the California Institute of Technology where he had been a member of the geology faculty since 1931 and executive officer of the Division of Geological Sciences since 1952. Dr. Campbell is widely known in the profession, as a result of his academic activities and his dedicated service to the scientific and technical societies of the profession. He holds membership in the following AGI Member Societies: AGU, AIME, AGT, GS, GSA, MSA, SEcG, AAPG. He is serving a second term as an AGI Director, representing the Geochemical Society.

Ian Campbell has been a member of the Executive Committee of the Western Governors Mining Advisory Council since 1954. In 1955 he served as chairman of the council's committee on research which produced an outstanding report on mineral research. The report was subsequently adopted for action in November 1955 by the Western Governors Mineral Policies Conference meeting in Sacramento.

O. F. KOTICK

elected to Scientific Manpower Commission

O. F. Kotick, consulting petroleum geologist of Sunnyvale, California, was elected in December to a three-year term as a member of the Scientific Manpower Commission representing the American Geological Institute. The AGI is one of ten of the largest scientific organizations in the United States which participate in the Scientific Manpower Commission. Howard A. Meyerhoff, a geologist, is Executive Director of the SMC.

Colonel Kotick, who last year retired from active military service, is the Chairman of the AAPG National Responsibilities Committee and recently became Chairman of the AGI Government Relations Committee.

GeoScience Abstracts

new, expanded abstract service offered by A.G.I.

GeoScience Abstracts is the new abstract journal which is being started by the American Geological Institute to replace *Geological Abstracts* which has been published by the Geological Society of America for the Member Societies of the AGI since 1953. The starting of the reorganized and expanded abstract journal is made possible through a grant from the National Science Foundation to provide initial working capital.

GeoScience Abstracts will be published monthly beginning January 1959. The format of the journal is being completely revised and it will feature expanded coverage. At the outset, *GeoScience Abstracts* will work toward complete coverage of North American geological literature, and abstracts translated from the Russian abstract journal, *Referativnyi Zhurnal,* will be included as the translations are processed by the AGI Translation Committee. It has been recommended by one AGI Member Society that coverage be extended to include all international abstracts published in English. The plans for *GeoScience Abstracts* as visualized do not include publication of international abstracts.

Organization by Subject

The new journal will feature organization of abstracts into fifteen subject sections, and the objective is to cover geology, solid earth geophysics and related areas of science. An effort will be made to provide effective coverage of geologic maps in recognition of the importance of maps to geologic literature. The subject sections are as follows:

1. Geologic Maps, Areal and Regional Geology *(incl. guidebooks).*
2. Geomorphology
3. Structural Geology
4. Stratigraphy and Historical Geology
5. Paleontology
6. Geophysics
7. Geochemistry
8. Mineralogy and Crystallography
9. Igneous and Metamorphic Petrology
10. Sedimentary Petrology
11. Geohydrology
12. Mineral Deposits *(incl. geochemical prospecting)*
13. Fuels
14. Engineering Geology
15. Miscellaneous

GeoScience Abstracts will continue to concentrate on authors' abstracts in an effort to provide a prompt, economical abstract service for the profession. It is recognized that there is considerable variation in authors' abstracts, but the journal will be dedicated to the task of promoting better author abstracts which will meet more exacting standards of length, content and quality than is now the case. Obviously not all literature can be covered by author abstracts. *GeoScience Abstracts* proposes also to use volunteer abstracting where necessary.

The cooperation of all regular geology-geophysics and other scientific journals is being sought as is the aid of all appropriate government agencies in Canada, Mexico and the United States. Colleges and universities which publish research results are being invited to contribute. There are many special arrangements which must be made to provide coverage of the literature appearing in the more obscure journals and in journals where geologic literature appears infrequently.

The keystone to the success of *GeoScience Abstracts* will of necessity be the *cooperation of the profession.* The full coverage of the literature can come only with the full and willing assistance of the profession, its authors and its publications. High quality and improved uniformity of authors' abstracts can come only with the concerted efforts of authors and editors. The profession in return for the required cooperation should have an abstract journal which will provide essentially complete and prompt coverage of significant literature. Naturally this will not be achieved in a month or a year. It may take as many as 3 to 5 years to bring *GeoScience Abstracts* to the desired level of coverage.

The staffing of *GeoScience Abstracts* has been hampered due to the lack of working funds, which did not become available until late December when the NSF grant

was received. Miss Anne C. Sangree, a geologist-geographer with considerable experience in abstracting, was the first member to join the anticipated editorial team and she is bearing the burden of getting the journal off the ground. Much assistance has been given in planning by Z. S. Altschuler, Michael Fleischer, Mary C. Rabbitt, Marie Siegrist, Dorothy Vitaliano, Rhodes Fairbridge, and Earl Ingerson. It is proposed that an editorial advisory board be established to aid in shaping policy of the new journal.

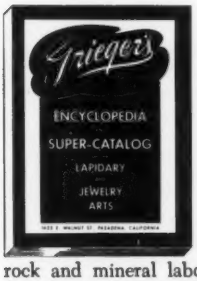
About 250 abstracts are scheduled to be published in the first (January 1959) issue of *GeoScience Abstracts*, and the journal is expected to contain between 3,500 and 4,000 abstracts during the first year.

The three-fold subscription schedule for *GeoScience Abstracts* which has been adopted is patterned after the schedule used by *Chemical Abstracts*. Individuals who are members of one or more AGI Member Society and are on the *GeoTimes* mailing list are entitled to a subscription rate of $15 per year, if they will pledge to restrict the journal to their own personal use. Non-member individuals (pledging restricted usage), colleges and universities and public libraries will be entitled to a $35 subscription rate. Private organizations and government agencies will pay the rate of $65. This rate schedule reflects the number of anticipated users and the ability to pay for the service.

To attract subscribers, a special introductory offer of 3 years' subscription for the price of 2 years is being offered.

To be successful, *GeoScience Abstracts* must be realistically and soundly financed. It is anticipated that the income from subscriptions will assure adequate financial resources to develop a satisfactory abstract service to serve the geosciences.

You saw it in GeoTimes . . .



ENCYCLOPEDIA AND SUPER-CATALOGUE of the Lapidary and Jewelry Arts. Of interest primarily to hobbyists and commercial jewelry producers. The catalogue does list many items of equipment and supplies used in rock and mineral laboratories. For information on cost write GREIGER'S, INC., *1633 E. Walnut St., Pasadena, Calif.*

At a recent Washington conference sponsored by the National Academy of Sciences, reports revealed that biological scientists are currently planning two college level movie films, one on meiosis, the other on evolution, together with about 120 half-hour movies for use at junior college, high school and lower levels.

In physics a complete elementary course is now available on film, as are also excellent movies on a number of more advanced college level topics. An advisory committee of chemists is supervising preparation of 160 half-hour films, now about four-fifths completed, covering subjects in high school and elementary college courses.

Such films, when prepared with rigorous standards, not only aid teaching, but also reveal many vistas in science to students pondering career choices. Thus they become a potent force in attracting *superior* minds to the fields chosen.

Our science needs similar films. Too many geology majors now come from would-be engineers who found math too difficult, from despairing chemists who stumbled over quantitative analysis, and from formerly hopeful biologists who feared statistics.

FILMS OF INTEREST

• THE ULTIMATE STRUCTURE. 16 mm. Sound. Black and white. 30 minutes. 1955. A film which probes the "ultimate structure" of matter, showing ways in which X-rays reveal that structure. Glass plates moving in liquids simulate interference phenomena. Laue diffraction diagrams of minerals and insecticides show some of the many possible variations in atomic structure. Powder diagrams are explained, and some uses of X-ray diffraction in modern industry are illustrated. A picture useful to students interested in crystal structure. DISTRIBUTOR: *Philips Electronics, Inc., 100 E. 42nd St., New York 17, N. Y. Loaned free; sold for $60.00.*

ASBESTOS—A MATTER OF TIME. 16 mm. Sound. Color. 23 minutes. 1958. After describing basic geologic theory about the origin of asbestos fiber, this film pictures mining and milling methods, and uses of the mineral in modern technology. DISTRIBUTOR: *Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.*

MANPOWER *in a column —*

By HOWARD A. MEYERHOFF
Scientific Manpower Commission
1507 M Street, N.W., Washington 5, D. C.

Readers of this column are aware of the limited professional use made of scientists and engineers in general, and of geologists in particular, in the Armed Forces. With the extension of the Draft Act scheduled for consideration early in this session of the 86th Congress, the Scientific and Engineering Manpower Commissions are exploring the possibility of introducing an option of professional-national service in lieu of military service for qualified technologists. To consider this and other possibilities, the National Academy of Sciences called a meeting broadly representative of the scientific and engineering professions on November 19.

Times have changed since the present Draft Act went into effect. Draft calls are low, and the military manpower pool is large. It is physically impossible to call all eligible men into service, even with the higher intelligence standards recently set by the Armed Forces. Yet the philosophy of "equality of sacrifice" is firmly imbedded in the public mind.

Chief element in the new SMC-EMC proposals involves the selection of qualified scientists and engineers for civilian service in the national interest, instead of military service. Power of selection would continue to reside in the Selective Service System. Enlistment in this scientific and technological program, though optional, would necessarily be restricted to young men with tested individual qualifications.

Within the scientific and technological service there should also be another option —namely, to pursue an unsubsidized educational program, or to accept a government subsidy analogous to that received in the ROTC. All men who enter this service should have imposed upon them obligations comparable to those placed on men entering the military service. Those dependent upon private support for their education should be required to utilize their specialties in some "essential activity," as defined in the List of Essential Activities. In essence, this is the same requirement as is currently imposed upon men who meet their military obligations via the Critical Skills Reserve Program. Men who accept government support for their education should be under obligations comparable to those of men in the ROTC. They would be obligated to enter government service, with a minimum two-year assignment on some scientific or technological post, whenever such posts are available. Thereafter all men in the scientific and technological service would be required to continue work in some essential activity for a period of time equivalent to the reserve obligation of men who enter military service.

Although these proposals were endorsed in principle at the November 19 meeting, their political fate is problematical.

AGI ROSTER for 1959

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UNION COLLEGE MARKS 100th ANNIVERSARY OF FAMOUS WHEATLEY MINERAL COLLECTION

Top: Geology Hall on the campus of Union College, Schenectady, New York was built in 1956 and houses the famous Wheatley mineral collection.

Middle: A view of a portion of the Wheatley collection of more than 7000 mineral specimens which was purchased in 1858 from Charles M. Wheatley, a well-to-do mine owner and ardent collector of Phoenixville, Pa., and presented to Union College by Edward C. Delavan of Albany, N. Y. The mineral display, which constitutes an excellent teaching collection, is open to the public.

Bottom: Professor Edward S. C. Smith, right, Chairman of the Department of Geology with one of Union's geology students examines a specimen from the one hundred year old Wheatley collection.

Research Support Available

Grants in aid in support of scientific research are available in amounts ranging generally from $500 to $1,500 through the American Academy of Arts and Sciences. The program favors individuals over organizations and preference is given to support of laboratory and field studies. There are February 1 and September 1 closing dates for applications, and additional information may be obtained by writing *Committee on Research Funds, American Academy of Arts & Sciences, 280 Newton Street, Brookline 46, Mass.*

You saw it in GeoTimes . . .

The topographic map series at the scale 1:250,000 (1 inch equals approximately 4 miles) which was started several years ago by the Department of the Army to meet military requirements is now complete and available for approximately 75 percent of the United States. The U.S. Geological Survey is responsible for printing and distributing this series for civilian use. An index map for this series may be obtained free on request from the *Map Information Office, U.S. Geological Survey, Washington, D. C.*

Geology & Geophysics Figure Prominently in . . .

WORLD PETROLEUM CONGRESS

New York
May 30-June 5

Geologists and geophysicists in twenty-two countries, including the U.S., are now preparing 57 papers for presentation at the Fifth World Petroleum Congress in New York's Coliseum May 30 to June 5 next year.

The papers, representing over twenty percent of the 289 to be given at the Congress, will examine the geology and the development of more than 30 widely scattered oil regions throughout the world.

These will include: the Parentis Field (France); the Northwest Salt Domes, the Gifhorn Trough, and the Upper Rhine (Germany); Ragusa and Gela (Sicily); the Cuanza Basin (Angola, Portuguese West Africa); Oman and the Hadhramaut (Arabian peninsula); Turkey; Israel; Iran; the Lower Indus Basin (Pakistan); the Gulf of Batabano (Cuba); the Bolivar Coastal Field (Venezuela); the flat bed regions of the USSR; the Central Congo Basin and French Equatorial Africa; Maquia Oilfield (Eastern Peru); the Northern Sahara Basins; the Central Valley of Chile; the Folded Molasse structure (Western Bavaria); the Vienna Basin (Austria); Argentina; Brazil; the Vogelkop (Western New Guinea); Yugoslavia; India; and Western Canada, including the Rocky Mountains and the McMurray oil sands.

In the United States, attention will be given to offshore California, the Gulf of Mexico, the Four Corners area, the submerged Atlantic Coastal plain and the Appalachians.

Mr. Ira H. Cram, director and senior vice president, Continental Oil Company, and Dr. H. D. Hedberg, vice president, Gulf Oil Corporation, are responsible for integrating the geological and geophysical papers into the Congress program.

Other Papers

The other papers will consist of 32 on drilling and production; 31 dealing with the mushrooming petrochemicals industry; 30 on refining, with an equal number on the utilization of petroleum products; 30 on new analytical methods and the composition of certain petroleum compounds; 23 discussing engineering problems; 20 on transportation and distribution; and 19 on operations research, statistics, and education.

For the first time in the quarter-century history of the Congress, a section of the program has been devoted to the results of research being undertaken by petroleum scientists into the present and future use of atomic energy in oil exploration, production, processing and product development. Seventeen papers are scheduled for presentation on these and related matters. One will attempt to forecast the probable impact of atomic energy on the world petroleum industry.

Additionally, there will be four general lectures by figures of international repute in the oil industry. One of these will be given by Roger Buttin, Societe des Petroles d'Afrique Equatoriale Francaise, who will speak on recent oil discoveries in Africa.

There will also be three symposia, each lasting a day, which will focus discussion on oil-bearing mother rocks; progress in sedimentology; and the viscosity-temperature relationship of lubricating oils.

It is expected that between 5,000 and 6,000 oilmen from 50 countries will be participating in the 100 technical sessions to be held the week of the Congress.

The preliminary program for the meeting is now available on application to: *The Fifth World Petroleum Congress, Inc., 527 Madison Avenue, New York 22, New York.* Being distributed with this program are the tentative list of papers, a brochure outlining twelve industry tours being organized in conjunction with the Congress, a list of the hotels in mid-Manhattan in which blocks of rooms have been provisionally reserved for Congress registrants, a program of entertainment for wives accompanying registrants, and registration forms.

Field Excursions

Of the 12 tours, two will be of particular interest to geologists, especially those attending the Congress from abroad.

One is a seven-day plane and motor coach tour (May 23 thru May 29) which will take in the Kermac uranium mines in the Ambrosia Lake district north of Grants, New Mexico, and significant geological areas in Wyoming and Montana.

This tour will include a motor trip across the Continental Divide, visits to the Butte oil field, Yellowstone National Park, and a flight by chartered plane to inspect the geol-

AGI Announces

VISITING GEOSCIENTIST PROGRAM

The American Geological Institute, aided by the National Science Foundation, is sponsoring a Visiting Geoscientist Program during the current academic year. The program will provide for visits of outstanding scientists in the fields of geology, solid earth geophysics and related areas of oceanography to campuses of colleges and universities throughout the United States. The visitors will spend approximately three days on campus and will participate in diverse affairs. The Visiting Geoscientist Program is planned primarily for the benefit of smaller departments of geology and geophysics, although larger departments will not necessarily be excluded. Between 30 and 50 visits will be scheduled, depending on various limiting factors.

Broadly, the objectives of the Visiting Geoscientist Program are:

- *To awaken interest of promising, scientifically inclined students in the "geo" sciences—geology and solid earth geophysics.*
- *To delineate the challenging research frontiers in the geosciences.*
- *To provide information on career opportunities and the academic preparation required for entrance into the various areas of the profession.*
- *To stimulate college faculties to improved instruction and to a better understanding of the frontiers of the science.*
- *To improve the understanding of the geosciences on the campus and in the community.*

The project is being conducted under the auspices of the AGI Education Committee, Dr. Chalmer J. Roy, Chairman. The roster of scientists to be invited to participate in the Visiting Geoscientist Program was selected by a panel consisting of Olin G. Bell, Carey Croneis, E. N. Goddard, J. Hoover Mackin, Chalmer J. Roy, Robert R. Shrock, and Joshua L. Soske. Invitations have gone out to the scientists, and all degree-granting departments of geology and geophysics have been invited to apply for participation in the program.

The campus visits will average 3 to 5 days in duration and with few exceptions, no scientist on the roster will be called upon to make more than one or two visits. The AGI has outlined general suggestions for the program of the visiting geoscientists, but the specific program for each visit is being left to the visitor and the host institution. It is expected that formal lectures will be presented by the visitor in his special area of interest and that he will participate in departmental seminars and colloquia. The visitor may also participate in faculty meetings. The visitor may also have time available for informal discussion sessions with students on matters relating to research, academic preparation, career opportunities and related matters. In a number of cases, the visitor will participate in a campus or community function which will focus attention on the host department.

The Visiting Geoscientist Program is patterned after successful visiting scientist programs already conducted by other scientific groups. The objective of these NSF supported visiting scientist programs is to contribute to the general improvement of science teaching and the understanding of research frontiers.

Schools inadvertently overlooked in the announcement of the program may obtain additional information on the Visiting Geoscientist Program by writing the American Geological Institute.

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ogy of the Big Horn Basin. The last day of the tour, the Billings Geological Association will conduct the party to Billings, Montana, where they will be offered a program of special technical interest.

The other tour of special interest to geologists is the five-day one (June 7-11) planned to oil fields, refineries, storage, port and offshore facilities and marine operations along the Gulf Coast from Houston, Texas, to New Orleans, Louisiana.

Fields arrangements and visits for the tour are under the sponsorship of the California Company, Cameron Iron Works, Humble Oil and Refining Company, Gulf Oil Corporation, Levingston Ship Building Company, The Texas Company and Warren Petroleum Company.

Reservations may be made through any of the American Express offices in the U.S. or abroad. In the case of reservations made outside the U.S., the transportation charges, which make up the major portion of the cost of the tours, may be paid in local currency.

DIPS and STRIKES[1]

At this time of year the annual crop of "new boys" is starting its slow progress through the mill called geology. This article is addressed to them, in the hope that it will assist them in the settling down process. At the outset it should be made clear that unless you are taking geology because you want to, your chances of success are small. People who are forced into taking it because of some examination or university requirements are never happy about it, neither are those who drift into it because, for some reason or other, they cannot take the subject they really wanted. This latter group should be carefully distinguished from those who, starting one subject, find geology (perhaps as a subsidiary subject) and realize that this is their true vocation. The real geologist is a full-time enthusiast, prepared to take up cudgels on behalf of his science at any time with anybody. He knows that there is not much money in geology (unless you are extraordinarily lucky), and that it is looked on by other sciences as a kind of poor relation, deserving of their charity. This is a state of affairs that the new geologist finds difficult to understand, but must learn to combat at every opportunity.

Geology is not an exact science—yet: it is still in the stage of observation and theory (except in one or two limited fields), and consequently there is no absolute authority who can settle disputes. The only way to find out who is right and who is wrong is to go and look for yourself. Fine theories, concocted in a library or laboratory can be destroyed instantly by a series of clear, unequivocal observations of real, natural phenomena. As far as geology is concerned, the sources of most of the primary data are the rocks themselves, as seen in their natural surroundings. Nobody, however refined his methods, can deduce in a laboratory the field relationships of a particular rock: you must observe them directly, in the field. If, therefore, you want to find out what geology is all about, take every opportunity of seeing rocks in the field. H. H. Read has said *"The best geologist is he who has seen most rocks"*: always remember that!

Geologists are few in number, consequently everyone knows everyone else. This results in a comradeship which extends over the entire world. Any geologist, however great his seniority, will be prepared to give help to a fellow student, however junior he may be. A real geologist will always welcome the honest inquirer who wants to find out for himself, and will often go to considerable trouble to do so.

Like all things in life, you cannot take out of geology more than you put into it, and in my experience, most geologists put in a great deal more than they get out of it. In the 21 years since the writer had his first contact with geology, he has never regretted his decision to become a geologist: we hope that the "new boys" of 1958 will be equally satisfied with their choice.

[1]Reprinted from the editorial column, *Dips and Strikes*, of the NEWSLETTER, No. 8, Sept.-Oct. 1958, published by the Geology Club, Kingston-on-Thames Technical College, England. Some things are different with our English colleagues, but it appears that the ingredients of a good geologist are the same in England and the world around.

MARINE GEOLOGY INSTITUTE

Florida State University in Tallahassee has announced a Summer Institute for college and university geology teachers. The National Science Foundation has made a grant in support of the Institute, which will be conducted from June 15 through August 7, 1959.

The subjects to be covered are marine geology, oceanography and ecology, with particular emphasis on shallow water marine environments. Leading authorities in the field from institutions, government agencies and industry will participate in the program. Following a six-week on-campus lecture and discussion program, the group will spend two weeks on field trips to Alabama, Georgia and Florida localities, including the present Coasts and Keys of Florida and the Bahama Bank.

The Institute will be open to members of faculty of degree granting earth science departments having appropriate educational background. Additional information concerning the Institute may be obtained by writing *Dr. Donn S. Gorsline, Oceanographic Institute, Florida State University, Tallahassee, Florida.*

WHO'S WHO

Twenty-two students of the Colorado School of Mines are listed in the 1958-59 edition of *Who's Who Among Students in American Universities and Colleges.* Ten of the 22 are geology majors and one is a geophysics major.

GEOLOGY in the Public Eye

by Robert L. Bates

In the *Saturday Review* of last November 8, geophysicist J. Tuzo Wilson of the University of Toronto reported on his visit to the city of Lanchow, which is becoming the scientific capital of Red China. The article got top billing . . . A German geologist, Henno Martin, is the author of a book, *The Sheltering Desert*, about a 3-year sojourn in the South African desert during World War II. One review says it's "an absorbing adventure that can hardly be too highly recommended." Illustrated, in English translation; published by Nelson . . . The uranium geologist that appeared in Chesterfield ads last October, called to our attention by Howard Cramer of Emory University, looked a lot more like one of us than the fashion-plate model in the full-page DuPont ad that Tom Wilson sent in. This is the second time DuPont has posed a synthetic geologist in front of a rock ledge . . . Books on geology and related sciences have been presented to two Tulsa high schools by the Tulsa Geological Society; *see page 17 GeoTimes, Nov.-Dec. 1958* . . . The Kansas Geological Survey is offering a scholarship in geology for the summer of 1959 to a qualified Kansas high school student. It consists of a salaried position on the Survey for 6 weeks, assisting in laboratory or field work . . . John Ludlum has written another illustrated booklet for the West Virginia series, on geology and recreation at Blackwater Falls State Park. He also furnished descriptive legends for signs in the park . . . Circular 5 of the Indiana Survey, by Bill Wayne, is "*Let's Look at Some Rocks*," for the younger fry. It gives the ways by which common rocks can be identified, equipment and directions for collecting, and references. Illustrated . . . Watson Monroe reports from Puerto Rico that "geology is very much in the youthful public eye of Latin America" because of a series of graded science textbooks, written in Spanish and widely used in some 15 countries. In the 5th-grade reader, *La Ciencia en Nuestra Vida*, 23 out of 220 pages are devoted to minerals, rocks, and the work of *geólogos*. The book is well written and beautifully illustrated. Monroe recommends it to geologists who want to practice their Spanish. The book is published by Ginn and Co., 72 Fifth Ave., N.Y.C. 11. Authors are Cebollero and Haydon.

XXI INTERNATIONAL GEOLOGICAL CONGRESS

Paper deadline approaches

April 1, 1959 is the deadline for filing abstracts of papers to be presented at the XXI International Geological Congress which will be held in Copenhagen, Denmark, August 15-25, 1960. Abstracts must be submitted in one of the six official languages of the Congress—English, French, German, Italian, Russian and Spanish—with a translation into English. The abstract should be typewritten and should not exceed 200 words in length. The abstracts should be submitted on or before April 15, 1959 to:

DR. THEODOR SORGENFREI, *General Secretary*
Organizing Committee
XXI International Geological Congress
Danmarks Geologiske Undersogelse
Geologisk Rigsinstitut
Charlottenlund, Denmark

The Organizing Committee reserves the right to accept or reject any paper offered. Acceptance does not imply that the paper will necessarily be published. Papers offered for presentation must be 5000 words or less (including illustrations) in length and must be submitted prior to September 1, 1959 together with illustrations and maps. Papers should be of general interest and should represent fundamental advancements in the various areas of geology. Cooperation in submitting completed papers as soon as possible will aid the Organizing Committee in their effort to provide preprints of many papers prior to the Congress.

Additional information on the filing of papers for presentation, the sections of the Congress, the field excursions and other data are contained in the official First Circular published by the Organizing Committee of the XXI International Geological Congress. Copies of the First Circular will be sent upon request by *Congress Travel, American Geological Institute, 2101 Constitution Ave., N.W., Washington 25, D. C.*

You saw it in GeoTimes . . .

MINERALIGHTS, ROCKS & RAINBOWS, a brochure describing the Mineralight, its operaction and applications for hobbyists, laboratory workers and prospectors. Also describes available equipment. Available free on request from *Ultra-Violet Products, Inc., San Gabriel, Calif.*

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[1] COMMITTEE OF 1,000—1959: This is a new committee made up of individuals contributing $10 or more in any given year. Dr. Robert Karpinski, originator of this committee, urges that local action groups be organized to solicit membership in the Committee of 1,000.

[2] COMMITTEE OF ONE HUNDRED FOR AGI: Persons pledging to contribute $100 or more per year for a period of five years comprise this committee which is important to the Institute's financial program. Details provided upon request.

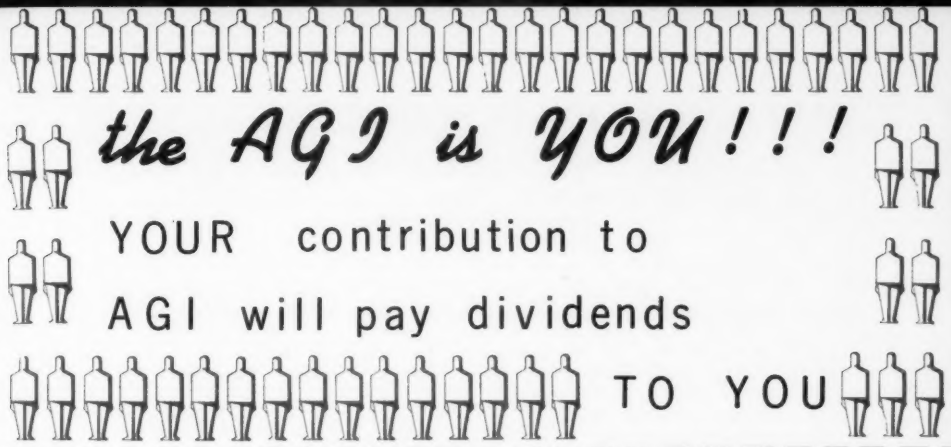
Some things you should know . . . about AGI and GeoTimes

- **No funds from AGI Member Societies' contributions can be diverted to support *GeoTimes*.**
- **Contributions of AGI Member Societies provide only for the minimum basic expenses of maintaining an Institute.**
- **Advertising provides more than half of the needed income for operating *GeoTimes*.**
- **Your individual contributions as *GeoTimes* readers must provide the balance of this income.**

Your contribution is vital to the very existence of *GeoTimes*.

Some other little known facts . . . about AGI and GeoTimes

- *GeoTimes* in reality has no staff. It has been from the start an extracurricular labor-of-love effort on the part of the AGI staff members who edit the magazine.
- AGI, in addition to publishing *GeoTimes*, performs many other services for the profession. To perform such services well AGI must be adequately staffed and financed.



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SOME TARGETS FOR POPULAR WRITING ON GEOLOGY

by MARK W. PANGBORN, JR.

About this time last year, *GeoTimes* printed a letter from Dodd, Mead & Co., publishers, who wanted to buy a career novel suitable for boys, featuring geology as a profession. About 20 geologists responded, several manuscripts were submitted, and we happily report that *Jeff Carter, Geologist*, by the husband-wife team of John and Jane Lemish, will soon roll from the presses.

Our success at midwifery tempts us to take a quick look at other *desiderata* along the lines of juvenile and popular books.

The field of biography and biographical fiction has been little more than touched. Many a great name in American geology is worthy of a volume—Leidy, Dutton, G. K. Gilbert, Jules Marcou and Edward Hitchcock, to mention a few—and we can think of at least a dozen topographical engineers whose adventurous careers are interwoven with the exploration of the Old West. Some of our petroleum geologists have led fabulous lives—truly the stuff of successful biography—yet V. R. Garfias' life stands alone in print. Mining engineers have fared little better.

A volume on the principles of coastal geomorphology is sorely needed at both the adult and at the age 11 to 15 level. Moreover, the only regional book in this field covers the Sea Islands of Georgia; such popular coasts as Cape Cod, Long Island, New Jersey, and Florida are without geological guidebooks. although several fine regional handbooks are available in the field of seashore biology.

Mountain physiography, including glaciers and volcanoes, "climbing geology" and avalanches, is without a modern book on principles, and, except for some scattered areas, our great ranges are undescribed. We would certainly like to see what Phil King or Erwin Raisz could do with the Colorado Rockies, possibly in collaboration with an ecologist like May Theilgaard Watts!

If you have ever felt like writing about the "roots of the American landscape," contact Miss Carol H. Woodward, Outdoor Books Editor, The Macmillan Co., 60 Fifth Avenue, New York 11, N. Y. Her firm is definitely in the market for popular books on regional geomorphology.

The major highways running from the Rockies to the West Coast surely deserve some attention. Perhaps a series of block diagram "strip maps," to cover each route after the manner of the maps in George R. Stewart's book *U.S. 40*, might be assembled on a 30 by 40 inch sheet, together with a pictured key for identifying roadside flora and fauna, a text with diagrams explaining the geological and ecological features of the landscape, comments on human occupancy, and a bibliography. Such a map as this, accordion-folded and sold for 50 cents from the sales racks so common in motels along the routes, would really bring geology to the public. This type of strip map might also appeal to those railroads which are equipped with dome cars, and perhaps to airlines.

A book on desert geology is long overdue. Although some good pamphlets on Death Valley have recently appeared, there is definitely room for a general volume on desert physiography, mineralogy, hydrology and ecology, based on the Mojave-Death Valley area, and with appropriate reference to other parts of the Great Basin. If the right authors, illustrators, and cartographers are brought together, a real classic could be in the making here!

Although several good volumes are now available on water conservation in the West, the layman finds no modern popular book on ground water and dowsing. Moreover, there is urgent need to displace Kenneth Roberts' three books about his amazing dowser, Henry Gross. Roberts' books have sold over 25,000 copies, which indicate considerable public interest in material on this vanishing commodity.

Another useful title might be a guide to collecting Paleozoic fossils. Drawing inspiration from Goldring's New York-oriented *Handbook of paleontology for beginners and amateurs*, such a field book would fit the fossils into the history of life, describe and illustrate them for recognition, and show the collector where he might best find them in eastern North America. If written for Simon & Schuster's Golden Guide series, such a book would sell by the hundred thousand.

An explanation of how mineral deposits originate, rather less formal than Bateman's *The formation of mineral deposits*, and organized around block diagrams and colored illustrations, would be keenly appreciated

(Continued on page 35)

EXTRA-TERRESTRIAL GEOLOGY

(Continued from page 9)

characteristic energy, and can thus be distinguished by radiometric counters. What are the possibilities and limitations of the mass spectrometer? All these techniques must be evaluated and tested first on Earth.

2B) *The Moon.* An attempt to circumnavigate the moon has already been made. It is questionable whether a relatively heavy vehicle designed to orbit the Moon should be launched directly from the Earth, or from a previously established space station in permanent orbit above the atmosphere. A space station, once in existence, offers great mechanical advantage to the lunar vehicle, but its construction is a difficult and expensive matter and we may not wish to wait for it. The navigational problems of lunar and planetary journeys are sketched in E. Burgess' book *"Satellites and Space Flight"* (Macmillan, 1957). The suggestion is made that a single radio transmitter, with directional antenna presumably gyroscopically oriented, in permanent orbit around the Moon, would serve to relay the findings of many small instruments transmitting data at various times from the Moon's surface. The problem of landing any vehicle on the Moon is complicated by its lack of atmosphere, necessitating some very precise rocketry.

Telescopes have revealed so many sterile and inhospitable attributes of the Moon that its appeal to the space scientist is correspondingly lessened, yet the Moon is still an indispensable proving ground for the techniques of space exploration, and may at some future time prove an advantageous base for limited purposes, such as telescopic observatories and radio transmitters, free of atmospheric interference. It has been pointed out elsewhere that giant electronic tubes can presumably function in space, or on the Moon, without the necessity for enclosing them in a vacuum. Radio transmitters of this type may be powered by solar energy.

2C) *Venus and Mars.* These two planets have priority not only by reason of proximity, but because their prevailing temperatures and pressures do not rule out the possibility of life, or of eventual exploration by man. Incidentally, the tacit assumption that life on Mars would be further evolved than ours may be wrong. If the rate of evolution of primitive life is a function of ambient temperature, then Mars may still be in the Proterozoic, and Venus correspondingly further ahead.

Since the Earth, Venus, and Mars move in the same sense around the sun, vehicular transit from one orbit to another is not a matter of direct radial flight away from or toward the Sun, but rather of an elliptical path tangential to both planetary orbits in which the escape velocity of 25,000 m.p.h. is added vectorially to the 66,000 m.p.h. orbital velocity of the Earth. This path is economical of fuel, and when the rocket is free of the Earth's gravitational field it will coast to its destination, with minor corrections by means of a homing mechanism. This path is, however, prodigal of time and distance, taking nine months and going halfway around the Sun to reach Mars, and this is a further argument against manned vehicles. The vehicle will be designed to graze the Martian atmosphere and go into orbit around the planet, by which time the Earth will be much closer to Mars than it was at the time of launching, and will be in a position to receive radio signals from the vehicle. Data gathered at a time inappropriate for direct transmission may be stored until called for. These weak signals may require amplification by a space station or lunar station free of atmospheric interference, before relay to Earth. (If an extra-terrestrial signal does not exceed the level of atmospheric "noise," no amount of amplification will pick it up.) Vehicles orbiting in the upper atmosphere of Mars, and spiraling down in the manner of last year's Sputnik, would give information on atmospheric density distribution sufficient to predict requirements for landing subsequent vehicles.

Phobos and Deimos

The approach to Mars is guarded by two natural satellites, each only a few miles in diameter, Phobos at only 3,800 miles above the Martian surface, and Deimos at 12,600 miles. These astronomical hand specimens will seriously perturb the orbit of an artificial satellite, unless this orbit can be precisely chosen and controlled. It has been suggested that Deimos constitutes a natural platform for the observation of Mars, from which manned spaceships could take off on the return flight to Earth, free of Martian gravity.

Mars has revealed enough surface detail to the telescope to stir imagination and speculation for hundreds of years, while the cloudy atmosphere of Venus affords no basis for conjecture, yet Venus seems by far the more promising subject for exploration by unmanned vehicles. One reason is the closeness of Venus, not appreciated by astronomers because at close approach Venus is between Earth and Sun, and hence invisible. When in opposition, Venus would

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appear 1/30 the diameter of the Moon, if illuminated. Venus approaches us within 26 million miles every 1.6 years, whereas the opposition of Mars, at 2.1 year intervals, varies between 35 and 63 million miles distance, due to the eccentricity of the Martian orbit. As explained above, energy requirements for the vehicle do not depend on minimum approach distances, but radio transmission does, and radio reception would be better from Venus than from Mars.

Another reason for an early study of Venus is the very lack of knowledge of this planet. Since it has no natural satellite, the mass of Venus is not accurately determinable. Neither the period of rotation nor axial direction are known, and of the surface features and topography we have not the slightest indication. To know even as much about Venus as we now know about Mars, vehicular probes are necessary, and the preliminary exploration of Venus is not only simpler but of higher priority than that of Mars.

Long Range Challence

Lest the statement of long-range aims appear unduly wild, I would assure the geological profession that I do not expect to live to see petrologists trudging the Martian deserts, nor paleontologists groping in the Venusian miasma. It is unlikely that the *Earthbound* stage, as set forth above, will keep us busy for many years.

The first step, as I see it, is for the geological profession to set up a research program for geological investigations by unmanned vehicles, under the National Aeronautics and Space Administration, with the responsibility and facilities for testing its projects on the Earth, via Earth satellites. Then when the rocket engineers and astronauts produce a vehicle, geologists will be ready with an itinerary and a project worthy of it. Unless the geologist is closely associated, from the beginning, not only with the possibilities and limitations of rocket and satellite engineering, but also with rocket and satellite budgets, his untested plans and suggestions will remain in the visionary realm, and the geologist himself in his own quiet and increasingly brackish environment.

help put

Ss Sam

into orbit

DEAR SANDSTONE SAM,

If the Russians are two years ahead of time, having analysed sulphur in a meteorite which fell in 1959 (*GeoTimes, May 1958*), then the Americans are very much behind, mentioning as the latest survey of student population that of 1598! (*Geotimes, Vol. II No. 11, p. 9.*)

Sincerely yours,
D. OBRUCHEV
Moscow
November 2, 1958

Editor's Note. We're all human!

DEAR EDITOR:

Congratulations upon the exceptionally appropriate, informative, and interesting Anniversary Issue of *GeoTimes*. It seems certain now that Henry's "baby" (p. 16, col. 1) has not only been led into the walking stage but gives potential signs of holding its own in the relay race with all competitors (individual or otherwise).

Best wishes, and may time never hang too idly on your hands.

Cordially yours,
ARTHUR BEVAN

DEAR EDITOR:

I am sending you, under separate cover, the first two copies of our "*Notiziario Del Geologo,*" published by the Italian National Association of Geologists (ANGI). As you shall see, our Notiziario was inspired by your GEOTIMES which is very appreciated by us.

If you like, I will send you copies of the next numbers.

Yours very sincerely,
The Director
PROF. ARDITO DESIO
University of Milan

DEAR EDITOR:

I feel very badly. Dr. Grabenhorst, the great and all knowing Geologist, has just kicked many of my friends out of the holy profession of Geology. Their great sin was to dare to solve many of the problems of the earth's history by using a nefarious device called an electric log, rather than the many times ineffective and cumbersome tools of the simon-pure Geologist which had failed to solve many of their problems. A possibly lesser sin was to use these non-geological tools to find oil. After all, no self respecting "Geologist" would soil his hands with a filthy economic project.

I am also sad that my friends wasted from four to eight years studying useless subjects when they could have learned the only skill they need in one year, i.e., correlating electric logs.

Would the Good Doctor admit William Smith to the ranks of the Geologists? He was an uncouth Civil Engineer. I feel sure that if Sir Charles had extended his studies of the Tertiary to the Gulf Coast he would soon have wished for a device like an electric log with which to make his correlations. As for Sir William, his studies of the Pre-Cambrian were made because that was the likliest place to find minerals of economic importance in Canada at that time (that was his job). If he were living today and heading the CGS he would surely be trying to find oil.

Intellectual snobs are as bad as any snobs. They are the very people who give "egg heads" a bad name with the public.

Yours very truly,
JACK ROWE

SIR:

Having read Professor Maxwell's article on "Better Geologists for Industry" and followed with interest the ensuing correspondence, I feel that as an exploration geologist with a Ph.D., albeit an English one, I should enter the fray.

I too have received the impression from several articles by, and conversations with, North Americans that a Bachelor's degree in Geology from a North American University is held in low regard and that a second degree of some sort is considered essential if a man is to get on. Whilst appreciating that in our profession a degree is only an entry permit, and that only time and experience will make the complete geologist, this is still surely a severe indictment of those universities that have a man for four years and yet send him on his way with an incomplete acquaintance with the basic ideas and mechanics of his trade.

Again, is it not unethical for a university to accept high fees and then turn out a certified product which is incomplete. There are constant complaints that Detroit sells care without such essentials as rear-view mirrors and heaters, for this smacks of cheap practice, but where is the basic difference?

Finally, I must take exception to Mr.

Shaw's remarks that "Ph.D.'s have more tools to use but not always more ability to think". It is not necessary that all the refined techniques should be taught to undergraduates for they will always find them in the literature, but if a Ph.D. cannot think and reason better than the average graduate then he should never have been awarded a doctorate. It is this capacity of clearer thinking that the Ph.D. has to offer the industry.

Your truly,
DR. T. RODGERS
Montreal, Quebec

DEAR EDITOR:

Each fall a few entering freshmen for whom I am faculty adviser express interest in geology as a major. Usually they have heard of the field from a relative or friend. This year one had become interested through Boy Scout work, and a couple had seen GEOTIMES in high school, and thought the subject looked interesting.

Verily, your magazine hath many uses.

Now if we can just corner a few of the mental whizzes who usually choose to major in physics or chemistry—.

Best regards,
HALL TAYLOR
Columbia University

DEAR DR. GRABENHORST:

I agree with you 150%.

Let all geologists keep their minds unsullied by anything other than the traditional knowledge as set forth by Lyell and Logan. Let all geologists maintain an amature standing in the world of physics, mathematics, and chemistry. Let all geologists know only that amount of the earth's crust that can be encompassed by a classical description of its appearance.

Do not delve into the electrical or radio-active characteristics of rocks because that is unholy knowledge. Do not attempt to analyze structures that cannot be seen. Do not try to unravel the environment of deposition unless you can get your feet on it.

In our academic circles, during these dark days, it has come to pass that we have some backsliders who interpret the geologic history of sedimentation by measurement of sand grains, some by weighing quantities, and even some who use physical properties of the earth's crust not yet determined in the days of Lyell and Logan. Let us not be led astray! Geology might become an exact science if we follow in their footsteps.

These academic heretics furthermore have been known to consort with purveyors of petroleum, and they have become tarred by the economic brush.

Let us then retreat, geologists, to the dark ages of science. Let us throw out all environmental and structural studies of the past 30 years because they contain profane data. Hide your heads and cover your ears, all true geologists, in the presence of these unholy men who look upon knowledge of the earth, from whatever source, as grist for the mill of understanding.

To quote from Sandstone Sam, *"Geologists never change their minds . . . they eventually die off."* Let's prove him right, Grabenhorst. Let's keep our feet on the ground, and our eyes on our feet. Otherwise we might see the dawn coming up around us.

Yours in dispair,
MARGARET S. BISHOP

DEAR MESSRS. SEBRING, STEINKOPF, HAUSEN AND CLINE:

But . . ., but . . ., but . . ., but . . .!

Sputteringly,
DR. GRABEN(UN)HORST

P.S. However, Sebring, failed to note that the future participle, subjunctive, "valet," was used rather than the past indicative form of the verb. Translated accordingly, most scholars would agree that two socks *will* incapacitate! In a future communication I shall have something further to say about modern training in the classical languages. Evidently a little knowledge may be dangerous.

DR. G.

RESEARCH ON LIME

JAMES L. EADES, geologist and research soils engineer on leave from the Virginia Department of Highways, is the first recipient of a three-year research fellowship on lime in clay mineralogy established by the National Lime Association at the University of Illinois, Department of Geology, under the direction of Professor Ralph Grim, outstanding authority on clay mineralogy. Eades received his B.S. and M.S. degrees in geology from the University of Virginia and for the past six years has been engaged in research on soil stabilization.

The research work under the fellowship will be directed toward the reaction of hydrated lime with selected pure clays and clay-type soils to determine the nature of the change in soil properties with the addition of lime. It is believed that the research will provide essential data on soil stabilization of particular importance in highway construction.

Do you have these ?

GLOSSARY OF GEOLOGY AND RELATED SCIENCES, J. V. Howell, Coordinating Editor, 325 pages, 1957, $6.00.

Over 10,000 copies sold.

DIRECTORY OF GEOLOGICAL MATERIAL IN NORTH AMERICA, second edition, 1957. J. V. Howell, A. I. Levorsen, with R. H. Dott and J. W. Wilds. 207 pages, $3.00.

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THE EARTH AND ITS GRAVITY FIELD *by W. A. Heiskanen and F. A. Vening Meinesz, McGraw-Hill Series in the Geological Sciences, McGraw-Hill, New York, 1958. $12.50.*

Even though the earth is not a true homogeneous sphere it does tend to approach a state of equilibrium. To the earth scientists, especially the geodesists and the applied geophysicists, the character and size of the deviations from this equilibrium is most significant both from a scientific and a practical point of view.

The authors of the book emphasize that a knowledge of the earth's gravity field is of basic significance for the investigation and study of these deviations and proceed in a logical manner to present the basic theory of the science of geodesy. With this fundamental knowledge and the rapid ability to obtain measurements of gravity over the surface of the earth it is believed that the true shape of the earth can be obtained.

The book is timely and important and is recommended to those who are interested not only in locating disturbing masses in the outer crust of the earth's surface but also in the true shape of the earth.

L.S.

THE LAW OF OIL AND GAS LEASES *by Earl A. Brown, Matthew Bender and Company, New York, 1958, 681 pp. $25.00.*

This book, a legal treatise on the oil and gas lease, examines and discusses each provision of the lease in the order in which it customarily appears on a "standard" lease form. Mr. Brown's background as Chairman of the Oil and Gas Division of the Southwestern Legal Foundation and as former General Counsel for the Magnolia Petroleum Company qualifies him as an expert on the oil and gas lease.

The book is not intended to serve as a primer for the layman merely desiring to obtain a working knowledge of the subject; indeed, it undoubtedly will become one of the recognized legal works on the oil and gas lease. Mr. Brown not only cites cases in footnotes; he also quotes from and comments upon the wisdom of the decisions rendered. In spite of this, Mr. Brown's discussions are sufficiently free of legal jargon to be readily understandable to those geologists who have a prior working knowledge of the oil and gas lease.

This reviewer has had no legal background; however, he found this book to be

WILEY BOOKS

ELEMENTS of GEOLOGY

By JAMES H. ZUMBERGE, *University of Michigan.* This new introductory geology offers balance (historical and physical geology receive equal stress), excellent illustrations, and pertinent examples. Although the subject matter is presented in a traditional fashion, it is not weighted down with heavy terminology and wordy discussion of minutia; the writing is clear and concise. Organized around the fundamentals of the science of geology, it begins with an account of the place of the earth in the universe and then goes on to describe the earth itself, its dimensions, its composition, its origin, and the major forces active to keep the earth in a dynamic condition. Throughout, the law of uniformitarianism is stressed. *1958. 382 pages. Illus. $5.50.*

BASIC GEOLOGY for SCIENCE and ENGINEERING

By EDWARD C. DAPPLES, *Northwestern University.* A basic understanding of physical geology is provided in this book, which treats the fundamental geologic processes, and sediment and rock types. It familiarizes the reader with the techniques of geologic interpretation and reconstruction of former geologic conditions. Arranged so that significant generalizations are predominant, instead of specific details, each chapter: observes and classifies data; determines the existence of any measurable relationship between properties; and interprets the relationships observed in order to formulate generalizations of the behavior of geologic processes. *Coming in January, 1959. Approx. 646 pages. Illus. Prob. $10.00.*

ATLAS of LITHOFACIES MAPS

By L. L. SLOSS, E. C. DAPPLES, *and* W. C. KRUMBEIN, *all of Northwestern University.* Representing the results of more than ten years of work, these maps reveal the distribution, thickness, and lithologic aspect of approximately 150 selected rock- and time-stratigraphic units in the United States and Southern Canada. From these graphically expressed data (including contours and two-color patterns), useful additions to the interpretation of the geologic history of the sedimentary rocks and the major structural fractures that affected their disposition may be made. The combinations of isopachs and facies lines provide major shelf, basin, and geosynclinal conditions during the deposition of each unit. *Coming in 1959. In press.*

Reserve examination copies now.

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very helpful in preparing expert witness testimony for cases involving the oil and gas lease. In particular, this reviewer found Mr. Brown's amplified section on implied covenants to be far more helpful than other well known books on the subject. It would be well worth while for any consulting petroleum geologist who contemplates preparing testimony for cases based on the oil and gas lease to have this book in his library. A.M.B.

THE PETROLEUM CHEMICALS INDUSTRY, *2nd Edition, by Richard F. Goldstein, 458 pp., 1958, John Wiley & Sons Inc., New York. $16.50.*

This comprehensive volume presents an up-to-date picture of the petroleum chemicals industry which has rapidly expanded and changed substantially since the first edition of 1949. Two new chapters on the history of the industry and on economics and statistics have been included. More than half the former chapters have been largely or completely rewritten.

The petrochemical industry is concerned with the manufacture of synthetic organic chemicals from various components of petroleum. The book explains the basic chemistry and processes used in preparing the major products involved and is a valuable reference for the industry.

P.B.

CATALOGUE OF PUBLICATIONS, *June 1958. Available free on request from the Utah Geological and Mineralogical Survey, 200 Mines Building, Univ. of Utah, Salt Lake City, Utah.*

INTRODUCTION TO HISTORICAL GEOLOGY, *2nd Edition, by Raymond C. Moore, 656 pp., 1958, McGraw-Hill Book Co., Inc., New York, N. Y. $7.95.*

This popular textbook in elementary geology has been completely revised in its second edition to include new subject matter, up-dated references and a host of new illustrations and maps. The many new photographs contribute much to the understanding of the accompanying text.

A TRANSLATION OF GEOCHEMISTRY, *an English translation of the Russian Journal of Geochemistry, 1958, no. 1, 130 pp. Write E. Wm. Heinrich, Mineralogical Laboratory, University of Michigan, Ann Arbor.*

This journal is the Russian equivalent of Geochimica et Cosmochimica Acta and has been translated for the Geochemical Society by V. P. Sokoloff under provisions of a grant from the National Science Foundation.

The manner in which this first number of the translated journal has been executed is a credit to the Geochemical Society. The translated literature should serve to significantly broaden perspective of the journal's readers.

REPORT OF THE LOWER PALEOZOIC NAMES AND CORRELATIONS COMMITTEE, *20 pp., 4 cross sections, 1958, Saskatchewan Geological Society, Box 234, Regina, Sask. $25.*

Report prepared by committee of the Society includes key stratigraphic data from 31 significant boreholes in the Williston Basin.

ENGINEERING HYDROLOGY *by Stanley S. Butler, 1957, Prentice-Hall Inc., New York, $7.00.*

This book emphasizes the quantitative approach to present-day hydrology problems. Although the greater part of the book is devoted to surface-water runoff, especially flood flow and low-water yield, the subjects of precipitation, evaporation, transpiration and ground water are all presented in considerable detail.

To date, only a few texts or reference books on hydrology have adequately presented modern methods of well hydraulics, a field that is relatively new and one that in general is poorly understood by engineers dealing with water-supply problems. The author has reviewed quite thoroughly the various methods and formulae that may be applied in the solution of typical ground-water problems.

The book has been written for two levels of interest. It attempts to provide a broad basis of general hydrologic information for those who are not primarily hydrologists, and secondly it is designed as a text for students in hydrology, with numerous problems at the end of each chapter. The solution of the more difficult of these problems requires a fairly thorough understanding of the principles presented. If there is any fault in the scope of this book, it is the difficulty of accomplishing both objectives in a single volume.

There are many illustrations and diagrams as well as a list of references that relate to the material in each chapter. The presentation of subjects is orderly and effective. Particularly for those who intend to make a career of hydrology, this is a valuable book which brings together in concise form both the principles of hydrology and the application of these principles in the solution of modern hydrologic problems. J.B.G.

appreciate

DATA SHEETS?

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SUPERPOSITION OF STRATA: Part 1

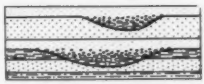
AGI 10

Physical Criteria for Determining Top and Bottom of Beds

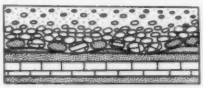
by
SIEMON WM. MULLER
STANFORD UNIVERSITY

Tracing of beds or recognition of a known normal sequence. The top and bottom of vertical or steeply inclined beds may be determined by tracing to or correlating with the known normal (upright) sequence (A) in the area where these strata are either only gently folded (at B) or not at all deformed (at A).

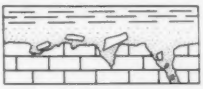
Scouring or channeling. Scouring or channeling of strata with subsequent filling of the channels will truncate the underlying strata. The concave sides of channels will generally point upward. The edges of beds truncated by erosion (unconformity) are toward the original top.



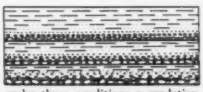
Conglomerates. Basal and intraformational conglomerates may contain pebbles and boulders which can be recognized as having been derived from the beds below.



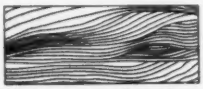
Solution surfaces. Irregular solution surfaces may form along the top of limestone beds or other relatively more soluble rocks.



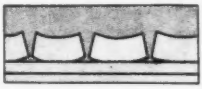
Graded bedding. In sediments with graded bedding, the texture will grade from coarse below to fine above. This often does not hold true in current-bedded deposits. Graded bedding may be present under various current, including turbidity current, conditions. However, it should be borne in mind that under these conditions a gradation in texture may be from coarse to fine as well as from fine to coarse. As originally defined by Bailey "graded bedding" should be restricted to the gradation in texture which is the product "of settling through comparatively still bottom water" in contrast to "current bedding" which is produced by "resorting and redistribution of material."



Cross-bedding. In cross-bedding one set of layers or laminae are truncated by overlying layers, but away from this contact the layers sweep along a concave curve to a conformable contact with the underlying layers. The concave side of cross-bedding generally points toward the original upper side. Individual cross-bedded laminae may show a downward gradation in texture from coarse to fine.



Mud cracks. Mud cracks generally decrease in width downward and may be filled with material which composes the overlying beds.



Ripple marks. In symmetrical ripple marks the crests (tops) are sharper than the troughs. Occasionally minor crests may be present in troughs.

ELEMENTS OF GEOLOGY, *by James H. Zumberge, 382 pp., 1958, John Wiley & Sons Inc., 440 Fourth Ave., New York, N. Y. $5.50.*

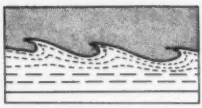
This book is an introduction to physical and historical geology, skillfully stripped of most geological jargon. It is intended primarily for use in the one-semester geology course which has been adopted by many colleges and universities. Processes are discussed in a brief, easy to understand manner. Approximately one half is devoted to historical geology. The book is well illustrated with diagrams and photographs.

DELO

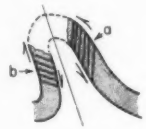
(Continued from page 11)

in the salaries and status of teachers." He went on to say, ". . . In the Soviet Union higher education is prized and those who prize it are prepared to pay the costs thereof." He also discussed the importance of the proper academic environment and the qualifications of the ideal teacher needed to make our educational efforts most successful. In conclusion he stressed the fruits of a successful partnership of the campus and the community.

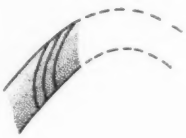
Sole marks are small, wave- or tongue-like penetrations of a coarse clastic material from above into a finer clastic material below along minor surface irregularities on a bedding plane. Some of these marks are explained by deformation or flowage of unconsolidated (and dilated or water-saturated) sediments due to gravity sliding along a primary incline of a bedding plane possibly triggered by earthquakes. These features tend to develop along a contact of sand (now sandstone) overlying a clay (now shale), but are rarely (if ever?) formed at the contact of clay overlying the sand.



Fracture cleavage. In the upright section of folded rocks the fracture cleavage is generally steeper than the bedding (a), but when the beds are overturned the reverse is true (b).

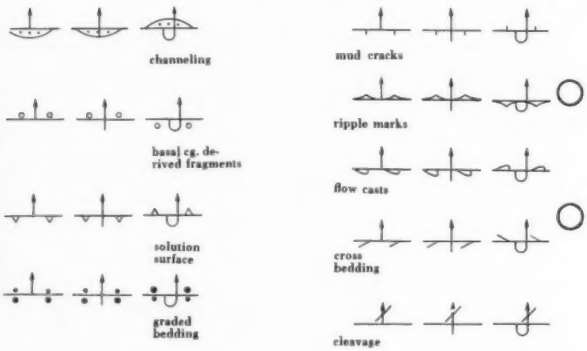


Curved fracture cleavage. Curved fracture cleavage may be observed in deformed beds where individual beds have a perceptible gradation of texture from coarse below to fine above (graded bedding). On the side with coarser texture (bottom) the angle between the fracture and the bedding will be larger or more obtuse than on the side with the finer texture (top or face of the bed). The convex side of the curvature of the fracture cleavage will bow out toward the original top of the bed.



Pebble dents. When the matrix is bulged around an imbedded pebble on one side only, this side is the original bottom (a). Apparent denting of laminated sediments above and below an embedded pebble may result from the subsequent compaction or compression of sediments (b).

SPECIAL MAP SYMBOLS
To Represent Criteria On The Basis Of Which The Top (Face) Of Beds Is Determined



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SOME TARGETS

(Continued from page 25)

in mining areas, where the questing reader is usually referred to dry textbooks; information on prospecting and mining might well be included here.

Engineering and military geology and geochemistry are other fields which have been slighted.

It goes without saying that, with the exception of biography, all of these books should be built around block diagrams and other graphics. Properly thought out illustrations cannot only convey geological phenomena and regional relationships more economically and forcefully than words alone, but can lend geology books a sales impact that will enable them to compete successfully with books on cowboys or space travel. When Aunt Effie picks out nephew George's Christmas present, we want her to buy that imaginatively-conceived, thoroughly worked out, and charmingly illustrated volume on say, mountain physiography, and not a gaudy book on Indians.

The A.G.I. feels that the writing of popular geology deserves what it seldom gets—absolutely the same effort and inspiration that goes into our best professional writing. It also feels that the immense popular science market, humbly approached, might well put an author in clover. After all, Rachel Carson's carefully made *The Sea Around Us* has sold one million, three hundred thousand copies and is still going strong. Zim and Shaffer's *Rocks and Minerals*, in Simon & Schuster's fine *Golden Guide* series, is selling at the rate of half a million copies a year, and several other good mineral books have passed the hundred thousand mark.

Your Institute will be glad to furnish a more extensive list of *desiderata* than that above, to anyone who feels the urge to try his hand in this challenging field. It can also provide lists of outstanding examples of the popular earth-science book, both foreign and domestic, and will be glad to assist any author in locating suitable illustrators and publishers.

Acts in Geology's Interest

NEW GEOLOGY HONORARY at OKLAHOMA

A Report by

HARRY TODD and BOB TILLMAN

At the University of Oklahoma an honorary fraternity has been born in the School of Geological Engineering. Gamma Tau Kappa received its charter in the spring of 1956 and honored thirteen students as charter members.

Since that time, the fraternity has initiated fifty-five additional members and granted two honorary memberships. Presently the fraternity is undertaking a program of nation-wide expansion.

The purpose of the fraternity is fourfold:

1. To recognize and encourage outstanding men displaying an equal appreciation for both engineering and geology.
2. To provide an incentive for other students to strive for similar conspicuous attainment.
3. To bring together members of the profession on a basis of mutual interest and fellowship.
4. To enhance and perpetuate the growing interest of industry in Geological Engineering.

Eligibility requirements for students are based on scholastic standing. Pledges must successfully complete a pledge training program including a written fraternity examination. Honorary memberships are awarded to outstanding graduates in Geological Engineering at the discretion of the fraternity.

The purpose of the graduate program is to extend our services to industry. Eventually, the fraternity plans to circulate a publication pertaining to all phases of our field. Graduates initiated will benefit from the fraternity while simultaneously helping Gamma Tau Kappa to unify the profession of Geological Engineering.

As part of the expansion program, Gamma Tau Kappa is inviting other universities to inquire about establishing chapters at their respective schools. All schools and individuals interested in obtaining further information, please write to the faculty advisor of Gamma Tau Kappa. *Dr. A. J. Myers, Gamma Tau Kappa, School of Geological Engineering, University of Oklahoma, Norman, Oklahoma.*

Popular Geology in Print

by Mark W. Pangborn, Jr.

It seems that the professional writers have finally discovered the lode of romance that lies in the lives of some of our pioneering geologists. The great early director of the U.S.G.S. has been excitingly brought to life in two new biographies for ages 12 to 16, *Leonard Wibberley's* WES POWELL, CONQUEROR OF THE GRAND CANYON (Farrar, 1958, $3), and *Dale White's* JOHN WESLEY POWELL, GEOLOGIST-EXPLORER (Messner, 1958, $2.95). These rather similar volumes naturally give the Colorado River explorations a big play, but Powell's struggles to get an education and his efforts to establish the Federal Survey are also well told.

Louis Agassiz, the Swiss paleontologist and glaciologist who became one of Harvard's greatest teachers, is likewise the subject of two biographies for teen-agers; one *Aylesa Forsee's* LOUIS AGASSIZ, PIED PIPER OF SCIENCE (Viking, 1958, $4), is amateurishly written, but A SCIENTIST OF TWO WORLDS, by *Catharine Owens Peare* (Lippincott, 1958, $3), is a well-organized and interesting work.

FIRST SCIENTIST OF ALASKA, WILLIAM HEALEY DALL, by *Edward A. Herron* (Messner, 1958, $2.95), is a readable, informative biography for ages 12 to 16, depicting the adventurous life of the malacologist and paleontologist who explored the Alaskan wilderness after the Civil War.

Geophysicist *Athelstan Spilhaus*, in his SATELLITE OF THE SUN (Viking, 1958, $3.50), has turned out a completely nonmathematical survey of geophysics, in which the sun, atmosphere, hydrosphere, polar regions and earth's interior are explained for ages 13 up. A more stimulating work is EBB AND FLOW, by German oceanographer *Albert Defant* (U. of Michigan Press, 1958, $4); this slender but meaty volume on the nature and measurement of tides will thrill any analytically-minded high school student or adult who has ever lived on the shores of the sea or sailed its waters.

ROCK CHIPS

by SANDSTONE SAM

A disgruntled GI geologist recently wrote the SMC complaining bitterly that the Army was not using him in his specialty which he stated (twice) to be "map interruption."

• • •

Dear Sam:

Exam Q.: "What is a phaneritic rock?"

Student: "A rock whose grains are large enough so that they can even be seen by the naked."

Yours for more
naked geologists.

• • •

Exercising more sagacity than he could possibly have realized, one freshman in an historical geology exam provided the following definition which should undoubtedly be incorporated in the Glossary—"Facies: lateral variations in mythology."

• • •

There was a New England erratic
Who complained in an accent emphatic
It would seem to appear
That I don't belong here
A fact which has made me neurotic

SUMMER INSTITUTES

On November 28, 1958 the National Science Foundation announced that it was supporting 350 Summer Institutes for high school and college teachers of science and mathematics at 255 educational institutions during the summer of 1959.

Of the 350 institutes listed in the announcement, only 6 were awarded to earth science departments. Birmingham-Southern College, University of Denver (geography), Wesleyan University, Wittenberg College and Clemson College are five earth science departments receiving institute grants. Florida State University has received a grant for an institute for geology teachers described elsewhere in this issue.

Geology departments are undoubtedly cooperating in other summer institute programs, but the fact that only 6 out of 350 awards are made directly to earth science departments could be construed as reflecting the general apathy of the geoscientists concerning the need for improvement of instruction in geology and related areas of science.

It is not too early to start planning a summer institute for 1960. Information on the NSF support may be obtained by writing *Summer Institute Program, National Science Foundation, Washington 25, D. C.*

FRANTZ
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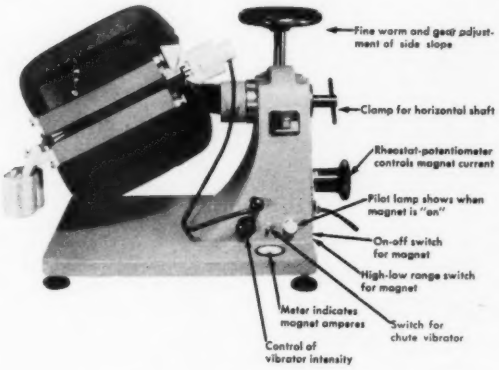
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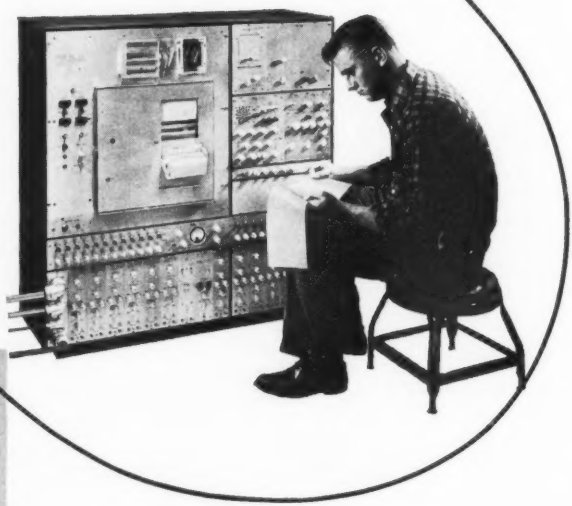

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BOX 398. WHO NEEDS A 29 year old, married exploration geologist with varied mineral deposit experience who can write? Has written articles and reports for all levels of geological interest and knowledge. Open to any attractive offer.

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BOX 483. PETROLEUM-GEOLOGIST, M.S. 30. Diversified experience; subsurface, research, teaching. Knowledge of Texas, mid-cont., Rocky Mts., Appalachian, Canada. Creative thinker, aggressive, proven oil finder, capable of organizing or operating exploration or research group. Desire domestic or foreign position of responsibility.

BOX 498. GEOLOGIST, Ph.D., 34, married, desires permanent teaching career. Background in sedimentation, sedimentary mineralogy and geochemistry, petroleum geology, principles of stratigraphy. Presently employed as research geologist by major oil company. Two years' teaching experience in small university.

BOX 502. GEOLOGIST, experienced explorationist with diversified background needs more responsible position. Experience includes subsurface studies, supervision and seismograph.

BOX 517. PETROLEUM GEOLOGIST, M.S., family, desires to relocate in Alaska. Diversified Arctic, Mid-continent, and Rocky Mountain experience. Currently employed by major oil company. Specialties include photogeology, surface and subsurface structure, stratigraphy. Creative thinker with leadership and administrative ability. Excellent references.

BOX 527. STRATIGRAPHER-PALEONTOLOGIST, Ph.D. before June 1959, 32, family. Four years varied petroleum experience, two years as university professor teaching historical, paleontology, stratigraphy. Research in Pennsylvanian-Permian microfaunas and stratigraphy. Will consider petroleum or teaching position. Resume on request. Available June 1959.

BOX 529. PILOT-PETROLEUM GEOLOGIST, 33, B.G., 2½ years experience with major company, both exploration and field work. Extensive flying experience with military air transports, both multi-engine land and sea. Presently flying with airline on equipment up through DC-6B aircraft. Desire position with expanding company needing aircraft and field geologist for wider range of operation, U. S. or overseas.

BOX 530. GEOLOGIST, 30, vet., single, B.S., some graduate work in mining geology. Two years experience in petroleum exploration. Desires position in mineral exploration, domestic or foreign. Available immediately.

BOX 532. GEOLOGIST-GEOPHYSICIST, 8 years experience glacial-groundwater and mineral exploration Lake Superior country; 13 years coordinating all phases oil exploration from off-shore Gulf to Canada and Illinois to Nevada. Desires responsible position directing geophysical program or as exploration coordinator where wide training and experience, better than average ability, and a capacity for hard work can all be utilized. Prefer Rocky Mountain location. Excellent references.

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BOX 534. PALEONTOLOGIST-GEOLOGIST, 28, M.A. 137 hours science, 47 business. Experienced writer. Curatorial assistant. Summer work: Latin America (surface), East (groundwater). Prefer paleo-stratigraphy. Consider anything in domestic petroleum.

BOX 535. GEOLOGIST-PHOTOGRAMMETRIST, BA, 27. Four years experience in airborne surveys and all phases of photogrammetry including planning and administration. Desires position in U.S. or overseas. Resume on request. Available January 1959.

BOX 536. GEOLOGIST, Ph.D., 30, family, desires teaching and research position in college or university, or research work with petroleum company. Principal fields micropaleontology and stratigraphy. Also proficient in sedimentology and petrography. Industrial and teaching experience.

BOX 540. GEOLOGIST, Ph.D., 29 married, desires teaching or survey position with research opportunities. Interested in general geology, petroleum geology, sedimentation, stratigraphy, paleontology, glacial geology, geomorphology. Three years experience as research geologist with major oil company.

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BOX 546. GEOLOGIST, B.S., last seven years employed as Chief Geologist for a mid-continent oil company, with diversified prior experience seeks geologist-retainer with independent operator or small aggressive oil company. Would also consider position in oil loan department of large bank. References and resume furnished on request.

BOX 547. GEOCHEMIST-MINERALOGIST, Ph.D., 34, married. Desires academic position, preferably one that combines teaching and research. Interested in crystal chemistry, phase rule, and synthetic mineralogy. Experienced in experimental geochemistry, microscopy, and x-ray diffraction. Publications.

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BOX 548. GEOLOGIST M.S., Petroleum and Mining experience, some Engineerng Geology experience, some management, married, family, 7 years petroleum geology in Rocky Mountain area, subsurface, surface, some photogeology, well setting. Mining and Milling of metal ores, Nevada and Calif., 10 years experience, would consider most places in U. S.

BOX 549. GEOLOGIST, 30 B.S., M.S., 6½ years varied experience in geological and geophysical exploration for metallic and nonmetallic mineral deposits. Heavy experience in property examination, research in mineral economics, report writing, planning and supervison of diamond drilling programs, field supervisory experience. Seeks position in mineral industry or related field with limited travel requirements. Now employed.

BOX 550. GEOLOGIST, M.S., (1955) 31, married, urgently desires permanent domestic position in the fields of either petroleum geology, mineral industry, geologic survey work, or teaching. Good references and academic record. Graduate work in hardrock geology and petrographic microscope. Some professional experience with U. S. G. S. Three years employment by major petroleum company overseas, surface and subsurface. Resume on request. Will appreciate interview opportunity.

BOX 551. LAWYER. Do you need a man with arts and Law Degree to teach Economics and Law courses? Ten years successful teaching experience with legal practice and business background. Available, fall of '59.

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BOX 552. GEOLOGIST, Ph.D., 34, married. Desires permanent teaching position in small to moderate size school and town, preferably in south or west. Broad geological background in teaching and research, especially in sedimentary rocks, principles of stratigraphy, petroleum geology, and mineralogy. Presently employed as geologist by major oil company.

BOX 553. ASSOCIATE PROFESSOR on sabbatical leave from June 1, 1959 to September 1, 1960, desires temporary work with petroleum or associated company. Ph.D. and experience in Gulf Coast, Rocky Mountains, Great Basin, Canadian Rockies, and Alaska in detailed and reconnaissance mapping, photogeology, paleontology, and stratigraphic analyses, with limited but working knowledge of well site and subsurface methods. Prefer to work somewhere in North or Central America, but South America considered. References on request.

BOX 554. ASSISTANT PROFESSOR, Ph.D. major university wishes to teach in college or university in more desirable area. 3 yrs. teaching and 6 yrs. varied industrial experience. Primarily interested, paleontology, sedimentation, marine geology, mineralogy. Active researcher, member prof. societies. Available June 1959. Resume on request.

BOX 555. GEOLOGIST, PETROLOGIST, MINERALOGIST, 27, single, Swiss, Ph.D. (Basel, honours). 7 years thorough education in all fields of Geology, Petrology and Mineralogy. Extensive field and laboratory work. Mineral research and field experience in the Alps and in arctic regions. English, German, French, Italian, some Spanish and Danish. Excellent references. Desires position with oil or mining company in U. S. or overseas.

BOX 556. PALEONTOLOGIST-STRATIGRAPHER, Ph.D., 30, family, 4 years teaching and 2 years field experience. Desires permanent position teaching invertebrate and micro-paleontology. Available Sept. 1959.

BOX 557. GEOLOGIST, Ph.D., Swiss, married, 37, Swiss degrees. French, English, German. 12 years experience in detailed and reconnaissance mapping, subsurface work, all phases of exploration and research for gold. Desires position for 2 years in U. S. in exploration for minerals. More interested in valuable experience than salary. Available in Fall 1959.

BOX 558. GEOLOGIST, B.S. in geology, 27, veteran, married, good academic training, heavy in geology, mathematics, and science. Some M.S. work. One year subsurface petroleum experience, minor mineral experience. Desires responsible petroleum, mineral, or academic position.

BOX 559. GEOLOGIST, M.Sc., 6 yrs. experience, West Texas, Venezuela and Libya; interested in electric log analysis and interpretation, facies studies. U. S. G. S. rating G-11, will travel; excellent references. Interested in petroleum industry and/or teaching.

BOX 560. GEOLOGIST, Ph.D., 37, family. Desires permanent teaching career. Six years university teaching experience in Physical & Historical Geology, Economic Geology and Geomorphology. Qualified to teach Structural Geology and Geophysics. Four years in geophysics with a major oil company.

BOX 561. PALEONTOLOGIST, 31, M.A., Ph.D., invertebrate and paleozoic interests and publications, eight years teaching experience Eng-

lish Universities, desires move to U. S. or Canada, preferably University or Museum post.

GEOLOGIST, GEOPHYSICIST, French, 33, single, fluent English, German, French degrees. 5 yrs. experience, proven minerals and oil finder, surface, subsurface, deep drilling geology, seismic, micro-petro., micro-paleon., in France, Germany, Sahara. Desires position of responsibility in Europe or America. Write PH. Berthelot, Ch. De La Ratte, Thonon, H. Savoie, France.

GEOLOGIST, 36. M.S. 1956. Married, family. Interested in U. S. or foreign work. Resume on request. James DeBruin, 858 Lancaster Ave., Syracuse, New York.

BOX 562. PALEONTOLOGIST. Ph.D., 32, married, 4 years industrial and research experience, 4 years teaching experience. Specialities geochemistry and paleoecology. Some experience in oceanography. Desires teaching position with time for research starting September 1959.

BOX 563. GEOLOGIST, B.A., 56, Single, 24. Experience; 1 year mapping, well core logging, sampling, Western Phosphate Field (Montana). 1 year Assist. Geol. U. S. G. S. Europe doing field work, map compilation, and report writing. Active military service completed. Desire geologist or geophysicist trainee position. Will go anywhere.

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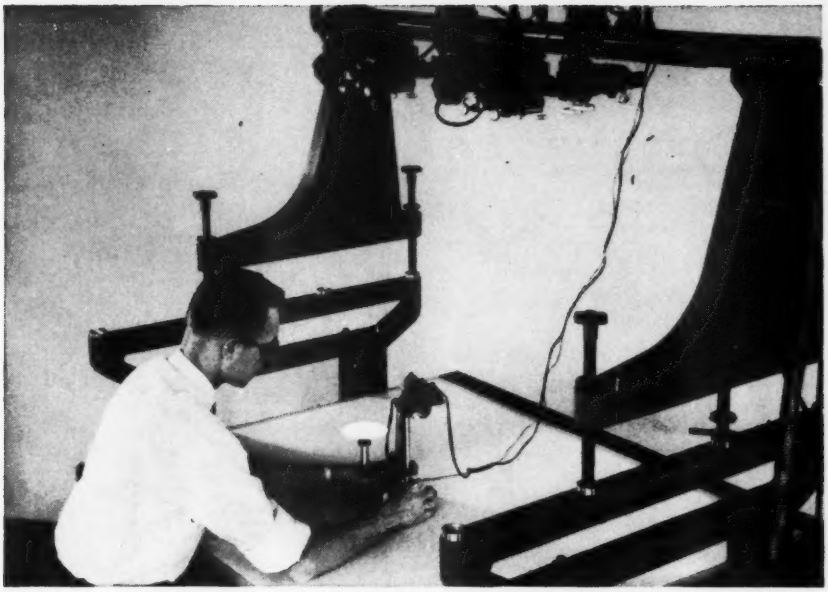

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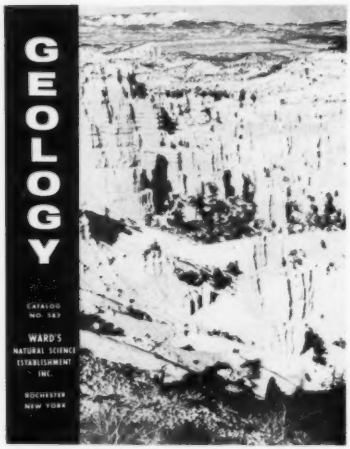

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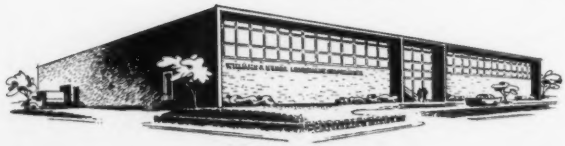

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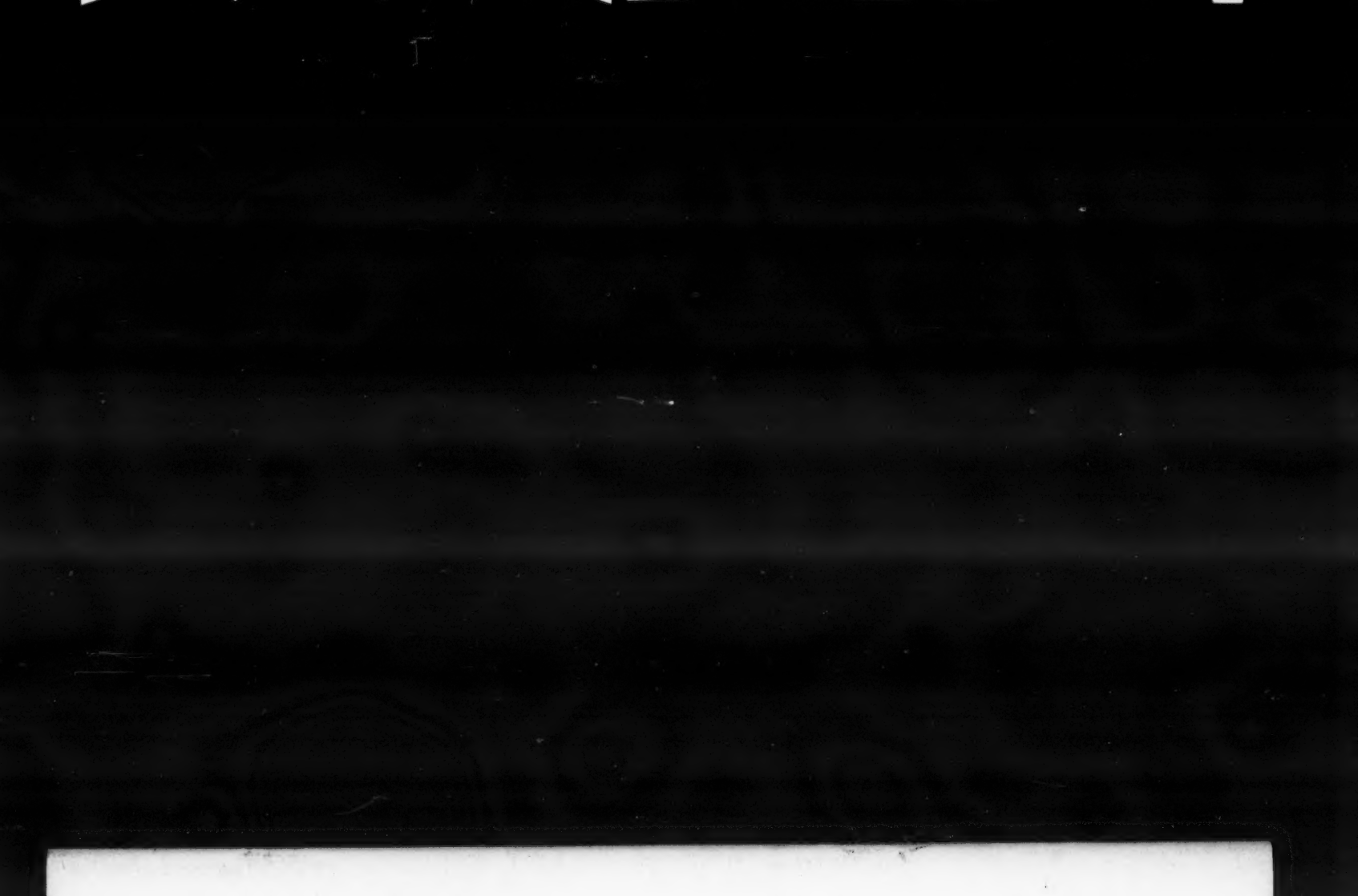
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